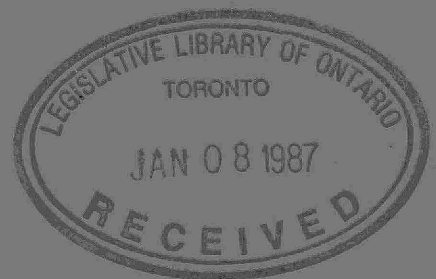
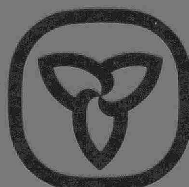


CA20N
EVR125
1986
057
c.2

OPERATING SUMMARY
OF
WATER POLLUTION
CONTROL PLANTS
THUNDER BAY DISTRICT
1985



NW-86-02



Ontario

Ministry
of the
Environment

W.M. VROOMAN
REGIONAL DIRECTOR

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OPERATING SUMMARY
OF
WATER POLLUTION
CONTROL PLANTS
THUNDER BAY DISTRICT
1985

CA20N
EVR125
1986
057
C.2

K. Watson
J. D. Shantz

NW-86-02
UTILITY OPERATIONS UNIT
NORTHWESTERN REGION
ONTARIO MINISTRY OF THE ENVIRONMENT
April, 1986

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SUMMARY

In 1985, the Ministry of the Environment, Thunder Bay District, operated seven water pollution control plants utilizing the activated sludge process. These projects treated $3,414 \times 10^3 \text{ m}^3$ (0.75 billion gallons) of sewage.

This report summarizes the 1985 effluent data from each plant in tabular and graphical form, following the data review. The quality of the final effluent, from these facilities, is evaluated against Ministry of the Environment "effluent quality guidelines". The guidelines require water pollution control plants to achieve the following effluent concentrations: BOD_5 - 25 mg/l, suspended solids - 25 mg/l, total phosphorous - 1 mg/l (where specifically required by the Ministry of the Environment).

A plant producing effluent concentration levels lower than the effluent quality guidelines is deemed to be successfully meeting compliance criteria.

All seven water pollution control plants in the Thunder Bay District successfully met the Ministry of the Environment effluent quality guidelines with respect to BOD_5 and suspended solids. Only one water pollution control plant was subject to the effluent quality requirement with respect to total phosphorous, Ignace. This plant complied with the 1.0 mg/l (or less) effluent requirement.

TOWN OF GERALDTON

BACKGROUND

Geraldton is located approximately 272 kilometres northeast of Thunder Bay and 8 kilometres north of the intersection of Highway 11 on Highway 584.

The water pollution control plant has a design capacity of $1.816 \times 10^3 \text{ m}^3$ per day and operates in the extended aeration mode. The plant was placed into service in 1974. The treated effluent is discharged to Kenogamisis Lake.

DATA REVIEW

The average daily flow for 1985 was $2.169 \times 10^3 \text{ m}^3$ which is 119.4% of the hydraulic design capacity of $1.816 \times 10^3 \text{ m}^3$. The hydraulic overload is suspected to be the result of residential sump pumps connected to the sewage collector system. During spring runoff or periods of heavy rainfall, the McKenzie Street lift station and occasionally the Edith Street lift station are unable to handle the large flows and portable pumps are utilized to bypass the flow to McKenzie Creek and Kenogamisis Lake respectively. This bypassing is in addition to bypassing at the sewage treatment plant. Approximately, $154 \times 10^3 \text{ m}^3$ (34 million gallons) of sewage was bypassed at the plant to the chlorine contact chamber, for chlorination, prior to discharge to Kenogamisis Lake. The plant treated a total of $791.746 \times 10^3 \text{ m}^3$ of sewage in 1985.

In order to rectify the hydraulic overload, the Ministry of the Environment has asked the town to survey the residents to determine if sumps pumping to the sanitary sewer is indeed the problem. In addition, the town completed separation of numerous sanitary sewer and storm sewer interconnections in 1984.

In spite of the hydraulic overload, the plant was able to meet the Ministry of the Environment effluent quality guidelines of 25 mg/l (or less) for BOD₅ and 25 mg/l (or less) for suspended solids.

The BOD₅ removal efficiency was 91% with an average effluent concentration of 3.8 mg/l. The suspended solids removal efficiency was 92% with an average effluent concentration of 6.0 mg/l.

The plant, although not designed for phosphorous removal, had a reduction efficiency of 58% through the plant process. The average total phosphorous concentration in the effluent was 1.7 mg/l. This plant is exempt from the Ministry of the Environment effluent quality requirement of 1 mg/l (or less) total phosphorous in the final effluent.

Total kjeldahl nitrogen levels in the final effluent averaged 2.0 mg/l, an 89% reduction from the average influent level of 24.8 mg/l. This reduction was achieved through the normal plant process. The Ministry of the Environment does not yet have an effluent quality guideline with respect to nitrogen, however, an 89% reduction is considered excellent.

Although hydraulically overloaded, the Geraldton water pollution control plant successfully met the Ministry of the Environment compliance criteria with respect to BOD₅ and suspended solids. In addition, total phosphorous and total kjeldahl nitrogen concentrations were reduced 58% and 89% respectively. It is expected that this facility will continue this high level of performance in 1986.

SEWAGE TREATMENT - PERFORMANCE REPORT

WORKS NUMBER :110001649 GERALDTON W.P.C.P. GESTP

TREATMENT FACILITY : EXTENDED AERATION

MUNICIPALITY :GERALDTON
REGION : 06 NORTHWESTERN
CURRENT POPULATION : 2901
POPULATION SERVED : 2901
PERCENT SERVED : 100OPERATING AUTHORITY : MINISTRY OF THE ENVIRONMENT
DESIGN CAPACITY : 1.816 10³M³/DAY DESIGN BOD5 : 170 MG/L

DESIGN SUSP. SOLIDS : 200 MG/L

THIS REPORT IS FOR THE YEAR 1985

<- FLOW DATA -><- B O D 5 -><- S S -><- TOTAL P -><- T K N ->

DATE	TOTAL VOLUME 1000 M3	AUG DAY 1000 M3 /DAY	MAX DAY 1000 M3 /DAY	TOTAL WTP 1000 M3	INFLUENT MG/L	EFFLUENT MG/L	INFLUENT MG/L	EFFLUENT MG/L	INFLUENT MG/L	EFFLUENT MG/L	INFLUENT MG/L	EFFLUENT MG/L
January	44.247	1.427	1.667	54.230	127.0	9.5	155.0	4.0	5.1	2.2	28.0	2.3
February	36.618	1.308	1.612	48.460	106.0	5.2	125.0	5.0	5.2	2.4	34.0	2.4
March	43.623	1.407	1.868	58.250	87.0	2.8	110.0	5.0	4.6	2.2	31.0	2.2
April	68.319	2.277	3.363	51.936	157.0	2.4	320.0	5.0	7.6	1.7	35.5	1.8
May	82.272	2.632	4.781	58.090	70.0	1.7	90.0	3.0	3.7	1.1	21.0	1.4
June	66.292	2.209	3.298	54.198	57.0	1.6	97.0	3.0	3.6	1.6	20.5	1.3
July	71.204	2.290	4.673	52.500	56.0	2.1	131.0	4.6	3.4	1.5	22.3	1.7
August	99.165	3.199	5.962	45.400	22.0	11.0	45.0	20.0	1.2	0.9	9.0	0.9
September	75.549	2.518	5.422	N/A	67.0	6.5	115.0	11.5	4.1	1.5	23.0	3.3
October	82.838	2.672	3.807	47.204	56.0	10.0	90.0	10.0	2.6	1.1	18.0	3.4
November	72.424	2.414	4.661	N/A	60.0	4.1	82.0	8.0	3.2	1.4	6.5	2.3
December	46.881	1.512	1.783	N/A	190.0	3.0	390.0	4.0	6.9	2.0	35.0	0.8
TOTAL	789.432			470.268								
MAXIMUM			6.0		190.0	11.0	390.0	20.0	7.6	2.4	35.5	3.4
AVERAGE	65.8	2.2	3.6	52.25	93.7	3.8	152.2	6.0	4.5	1.7	24.8	2.0
TOTAL PERCENT REDUCTION					91.1		91.6		58.0		89.2	
NUMBER OF SAMPLES					25	25	25	25	25	25	25	25

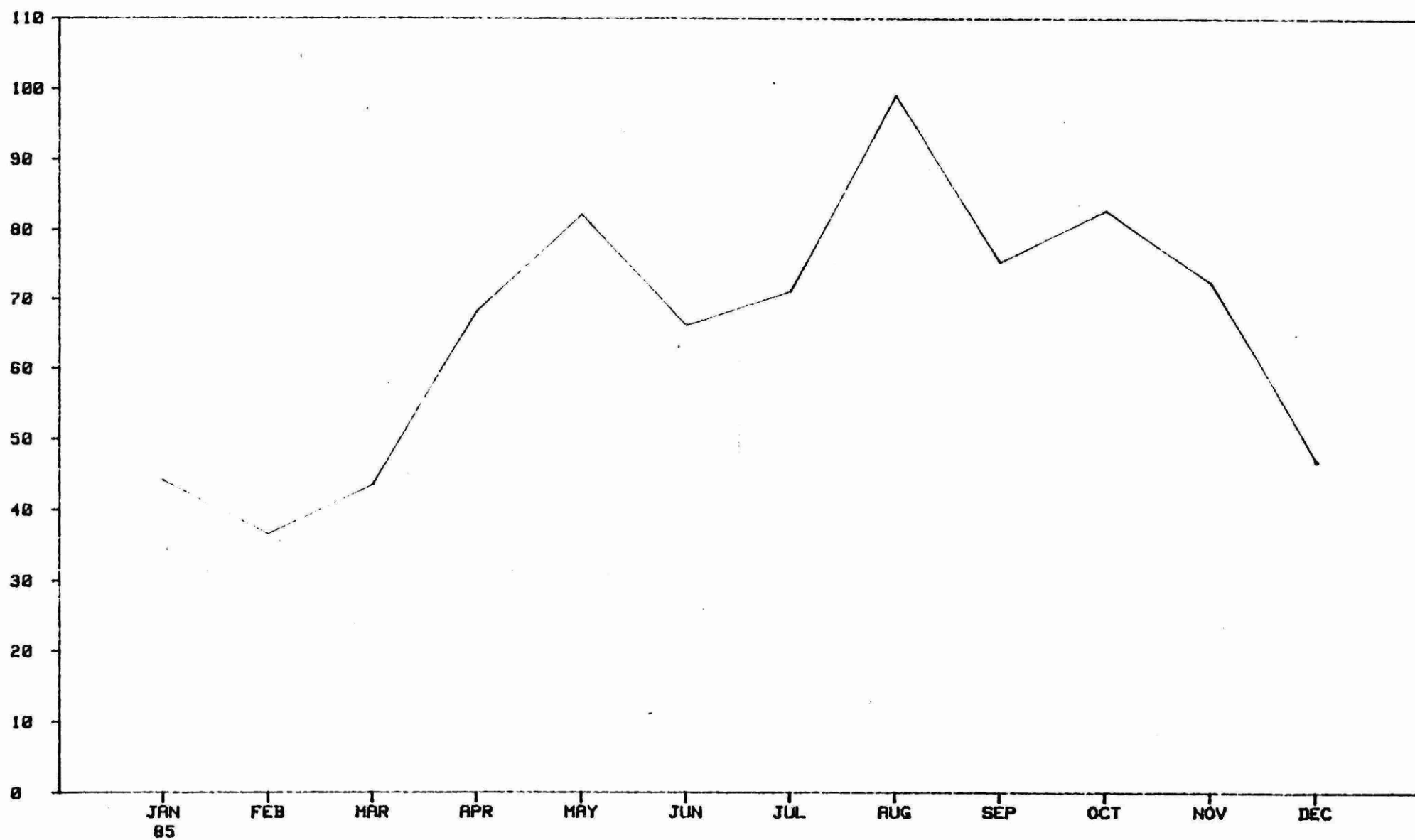
GERALDTON W.P.C.P. 1985
TOTAL VOLUME

AXIS
L

LEGEND

FLOW - TOTALVOL.

- 18-3-85



SAMPLE DATES

GERALDTON W.P.C.P. 1985
AVERAGE DAILY FLOW

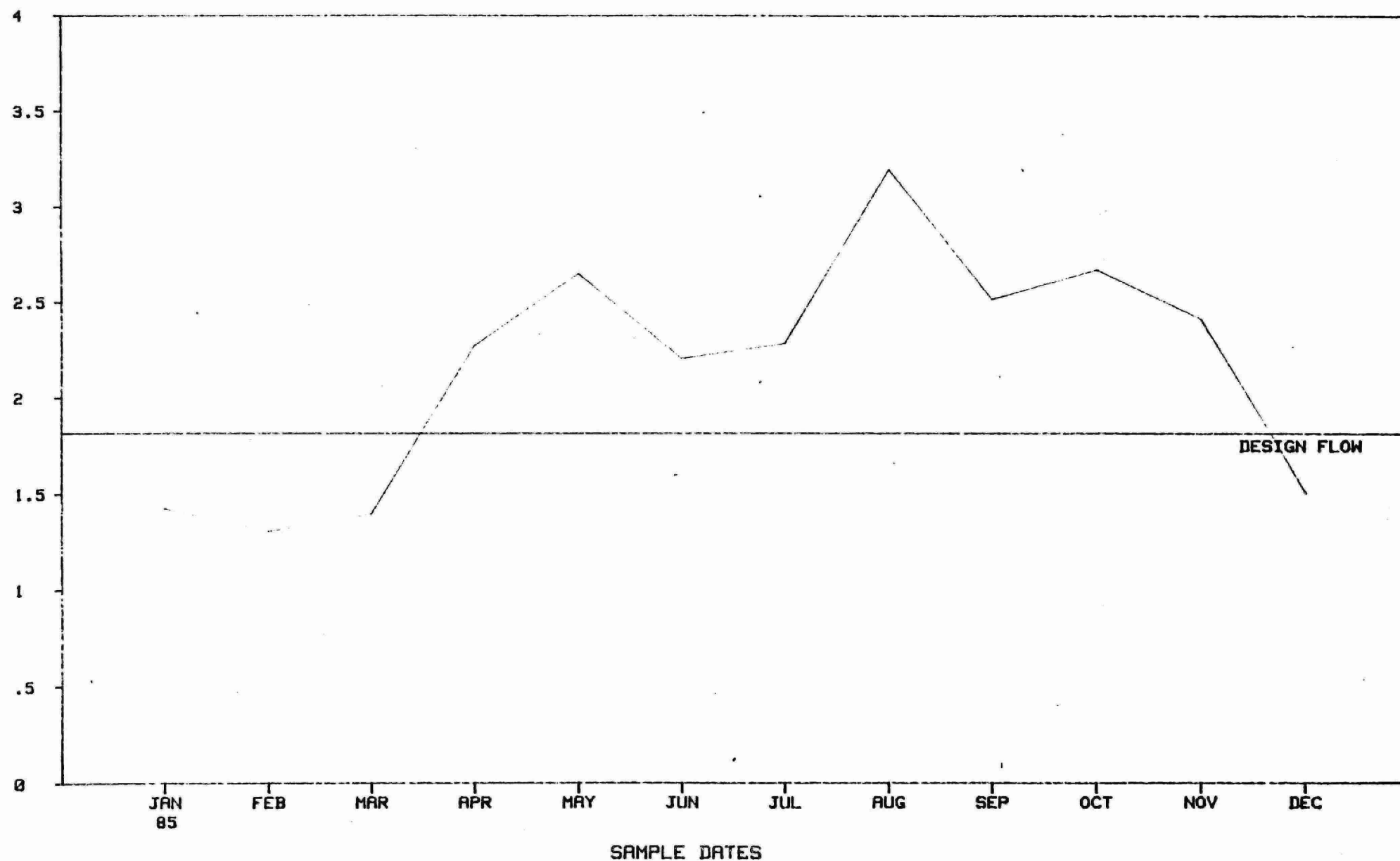
AXIS

L

LEGEND

FLOW - AVG. DAILY

- 10⁻³m³/d



GERALDTON W.P.C.P. 1985
INFLUENT VS. EFFLUENT
B.O.D. CONCENTRATIONS

AXIS

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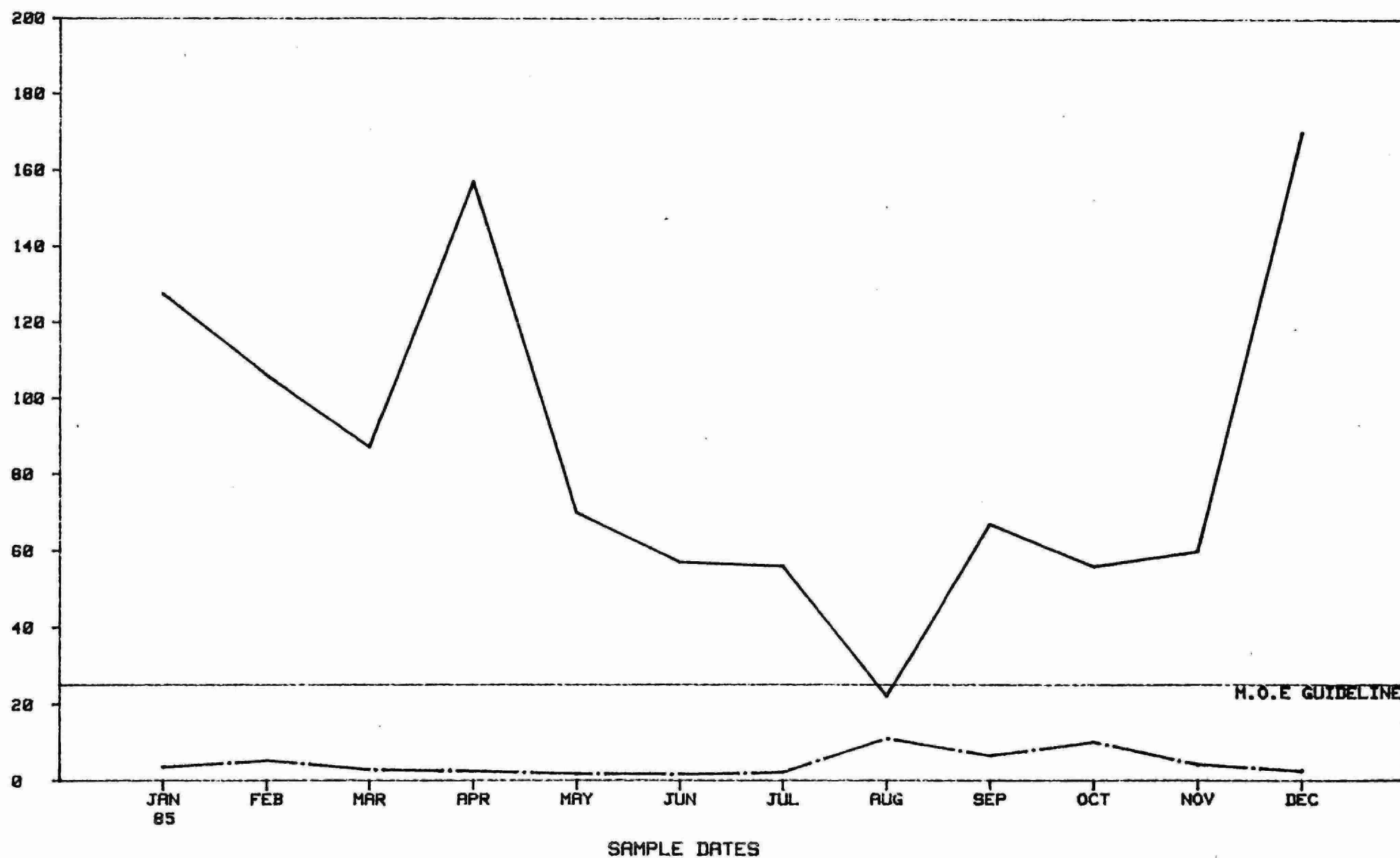
LEGEND

RAW SEWAGE - BOD

- mg/l

PLANT EFFLUENT - BOD

- mg/l



GERALDTON W.P.C.P. 1985
INFLUENT VS. EFFLUENT
SUSPENDED SOLIDS CONCENTRATIONS

AXIS

L

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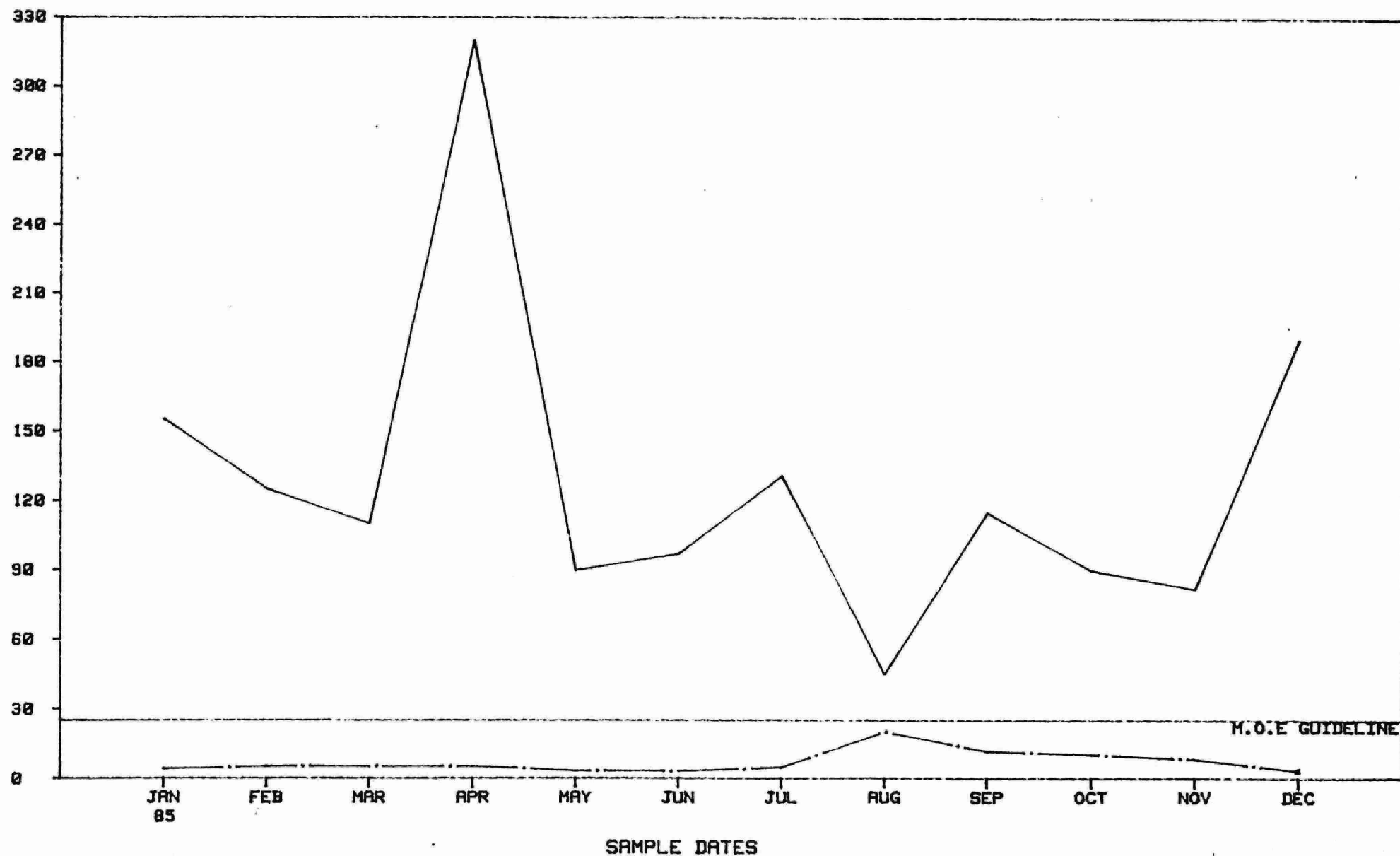
LEGEND

RAW SEWAGE - SS

PLANT EFFLUENT - SS

- mg/l

- mg/l



TOWNSHIP OF IGNACE

BACKGROUND

The Township of Ignace is located on Highway 17, approximately 250 kilometres west of Thunder Bay.

The water pollution control plant serves approximately 2,000 residents and is operated by the Ministry of the Environment.

The treatment facility consists of two package-type extended aeration units. The original unit was completed in October, 1972. The addition of the second unit, in 1976, increased the treatment capacity from 786 m³ per day to 2,497 m³ per day. The operator may, if he wishes, automatically proportion the raw sewage between the old and new units on the basis of 33.3% and 66.7% (dry weather flow) respectively.

As the facility normally experiences flows well below the design capacity, the larger unit normally receives all of the flow. The older unit is used as an aerated sludge holding tank. During the extremely cold months of December and January, the older unit is placed into service to avoid freezing problems.

Agimac Creek serves as the receiving stream for the plant effluent. Sandbar Lake, approximately 7 kilometers downstream of the plant outfall, is a nutrient rich lake. Phosphorous removal was incorporated in the 1976 plant expansion to minimize nutrient loading on Sandbar Lake.

DATA REVIEW

The plant received an average daily flow of $1.8 \times 10^3 \text{ m}^3$ which is 72% of the overall design capacity of $2.497 \times 10^3 \text{ m}^3$ or 105% of the larger unit's capacity of $1.711 \times 10^3 \text{ m}^3$. A total of $639.8 \times 10^3 \text{ m}^3$ of sewage was treated in 1985.

The plant achieved a 96% reduction in BOD_5 with an average effluent concentration of 2.7 mg/l. This is well below the Ministry of the Environment effluent quality guideline of 25 mg/l (or less) BOD_5 in the final effluent.

The average suspended solids concentration in the influent was 106 mg/l, while the average suspended solids concentration of the effluent was 11.5 mg/l. This is an 88% reduction in suspended solids, through the plant process, and met the Ministry of the Environment effluent quality guideline of 25 mg/l (or less) suspended solids in the final effluent.

Total phosphorous levels were reduced from an average influent concentration of 4.0 mg/l to an average concentration of 0.6 mg/l in the final effluent. This is an 83% reduction. The concentration of 0.6 mg/l total phosphorous was under the Ministry of the Environment effluent quality requirement of 1 mg/l (or less) total phosphorous in the final effluent.

Total kjeldahl nitrogen levels, as yet not covered by a Ministry of the Environment effluent quality guideline, were reduced 90% to an average level of 2.2 mg/l in the final effluent. This is the level of performance expected of a well operated extended aeration plant.

The Ignace water pollution control plant successfully met the Ministry of the Environment effluent compliance criteria with respect to BOD_5 and suspended solids, and total phosphorous effluent quality requirements. The plant was achieving nitrification with a 90% reduction in total kjeldahl nitrogen levels.

SEWAGE TREATMENT - PERFORMANCE REPORT

WORKS NUMBER :110001355 IGNACE W.P.C.P. IGSTP

TREATMENT FACILITY : EXTENDED AERATION

MUNICIPALITY :IGNACE
REGION : 06 NORTHWESTERN
CURRENT POPULATION : 2285
POPULATION SERVED : 2185
PERCENT SERVED : 96OPERATING AUTHORITY : MINISTRY OF THE ENVIRONMENT
DESIGN CAPACITY : 2.497 10³M³ DESIGN BOD5 : 170 MG/L

DESIGN SUSP. SOLIDS : 200 MG/L

THIS REPORT IS FOR THE YEAR 1985

<- FLOW DATA					-><- B O D 5		-><- S S		-><- TOTAL P		-><- T K N		->	
DATE	TOTAL VOLUME 1000 M3	AVG DAY 1000 M3 /DAY	MAX DAY 1000 M3 /DAY	TOTAL WTP 1000 M3	INFLUENT MG/L	EFFLUENT MG/L	INFLUENT MG/L	EFFLUENT MG/L	INFLUENT MG/L	EFFLUENT MG/L	INFLUENT MG/L	EFFLUENT MG/L	INFLUENT MG/L	EFFLUENT MG/L
January	37.021	1.194	1.308	68.390	86.0	2.8	100.0	30.0	5.2	1.1	27.0	3.0		
February	30.674	1.096	1.200	55.400	72.0	3.0	100.0	10.0	4.9	0.7	27.0	3.8		
March	33.164	1.060	1.209	50.700	106.0	2.3	180.0	12.5	6.6	1.0	37.0	2.5		
April	35.617	1.187	1.773	N/A	87.0	3.8	150.0	13.0	6.0	0.8	36.0	3.6		
May	76.393	2.464	3.442	45.600	40.0	3.2	67.0	11.0	3.8	0.8	28.0	2.7		
June	61.665	2.056	2.415	36.137	60.0	2.8	90.0	9.0	3.3	0.5	18.5	1.7		
July	56.238	1.814	2.246	29.606	56.0	4.0	78.0	8.5	2.3	0.4	11.0	1.4		
August	52.525	1.634	2.067	25.080	54.0	3.4	92.0	10.0	3.0	0.5	16.5	1.7		
September	64.000	2.133	3.998	22.390	54.0	1.6	65.0	13.0	3.1	0.6	15.0	1.8		
October	93.842	3.128	3.420	N/A	50.0	1.1	163.0	10.7	2.8	0.5	14.3	1.4		
November	55.660	1.855	2.506	N/A	95.0	1.8	98.0	8.0	4.1	0.5	25.0	1.5		
December	42.984	1.386	1.678	N/A	42.0	0.7	88.0	9.0	3.5	0.7	30.0	1.8		
TOTAL	639.783			333.563										
MAXIMUM			4.0		106.0	4.0	180.0	30.0	6.6	1.1	37.0	3.9		
AVERAGE	53.3	1.8	2.3	41.70	66.1	2.7	106.6	11.5	4.0	0.6	23.6	2.2		
TOTAL PERCENT REDUCTION					95.9		87.6		82.9		90.2			
NUMBER OF SAMPLES					25	30	26	31	26	31	26	26		

IGNACE W.P.C.P. 1985
TOTAL VOLUME

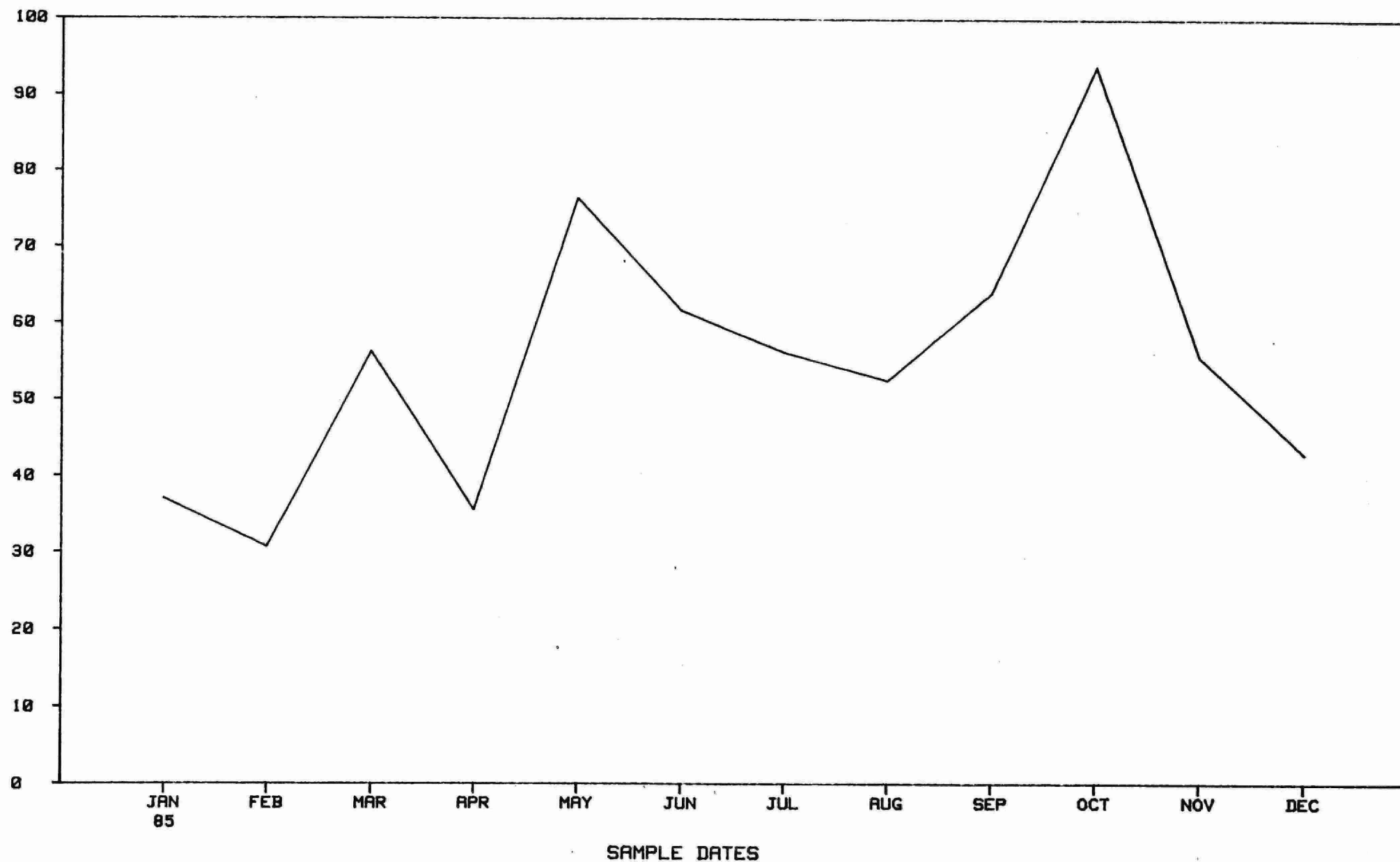
AXIS

L

LEGEND

FLOW - TOTALVOL.

- 18-3m-3



IGNACE W.P.C.P. 1985
AVERAGE DAILY FLOW

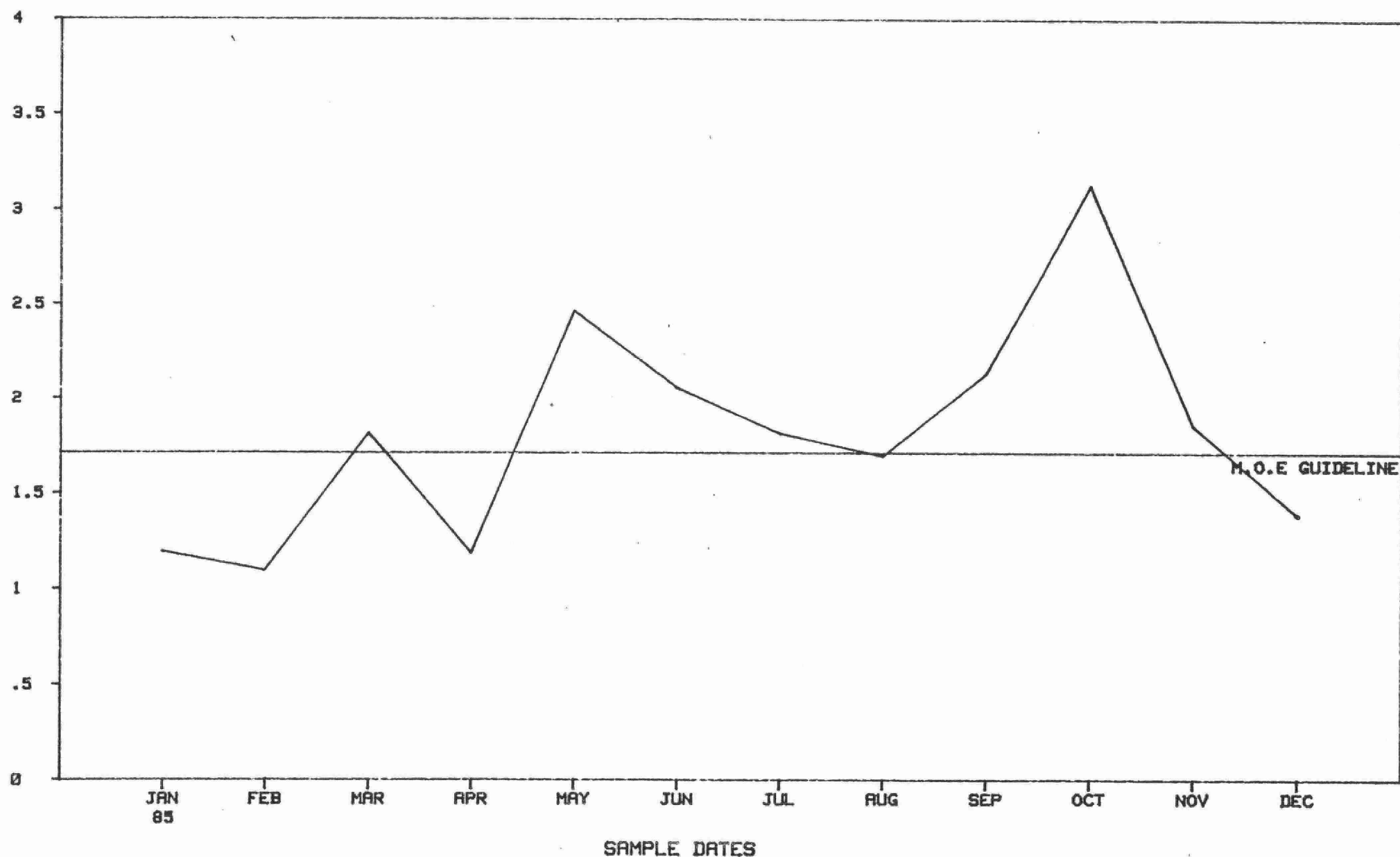
AXIS

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LEGEND

FLOW - AVG. DAILY

- 10-20-85



IGNACE W.P.C.P. 1985
INFLUENT VS. EFFLUENT
B.O.D. CONCENTRATIONS

AXIS

L

L

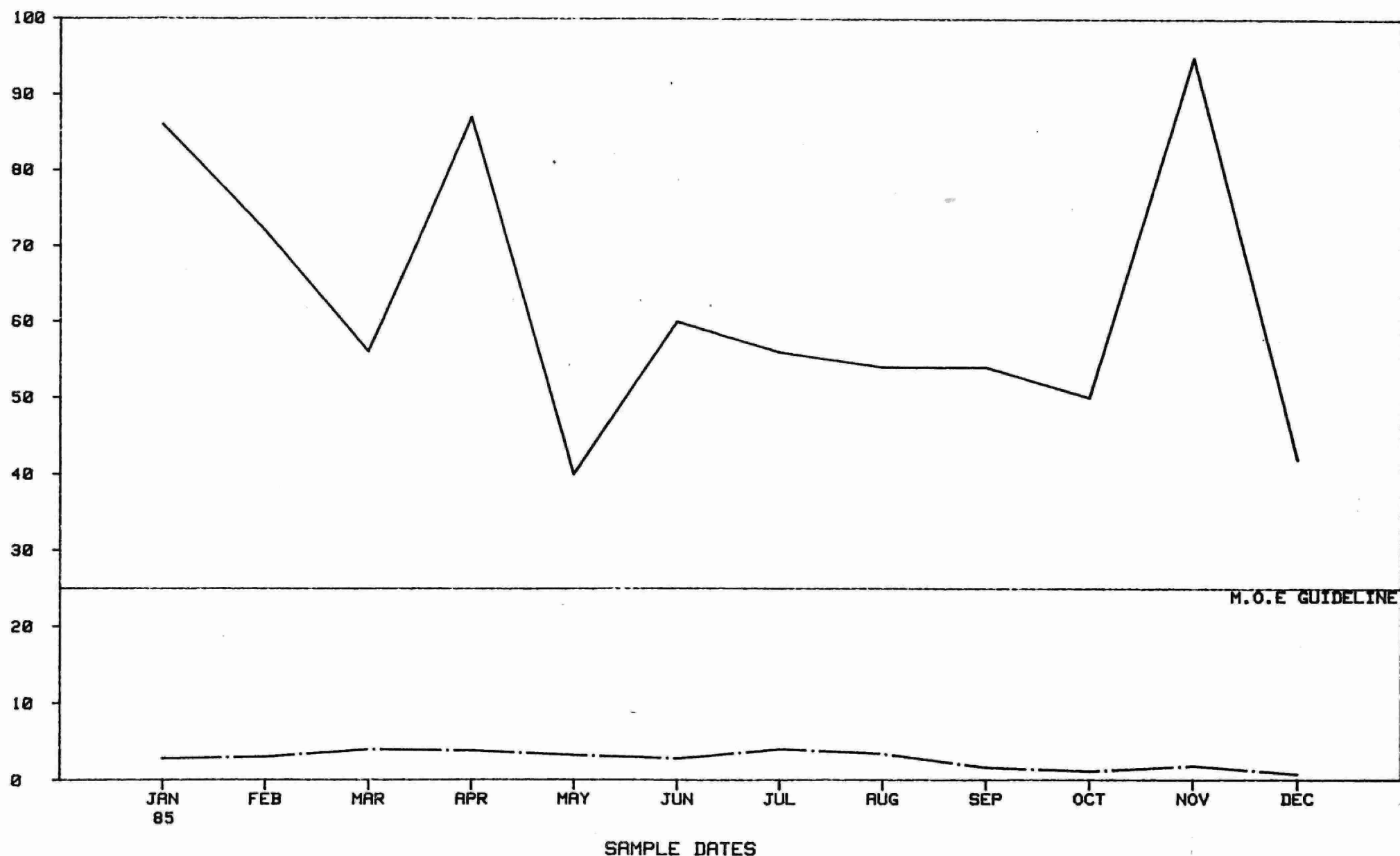
LEGEND

RAW SEWAGE - BOD

- mg/l

PLANT EFFLUENT - BOD

- mg/l



IGNACE W.P.C.P. 1985
INFLUENT VS. EFFLUENT
SUSPENDED SOLIDS CONCENTRATIONS

AXIS

L

L

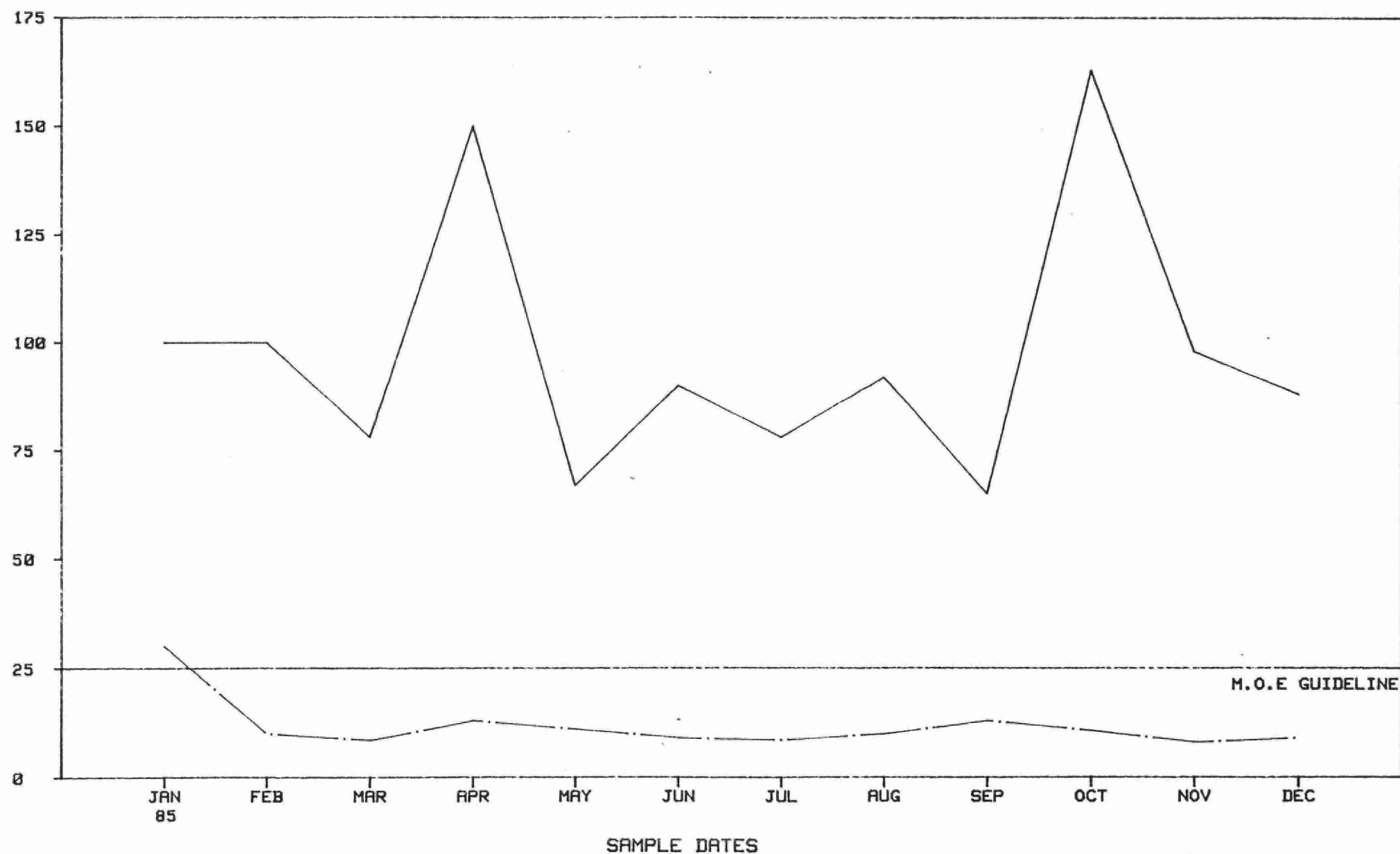
LEGEND

RAW SEWAGE - SS

PLANT EFFLUENT - SS

- mg/l

- mg/l



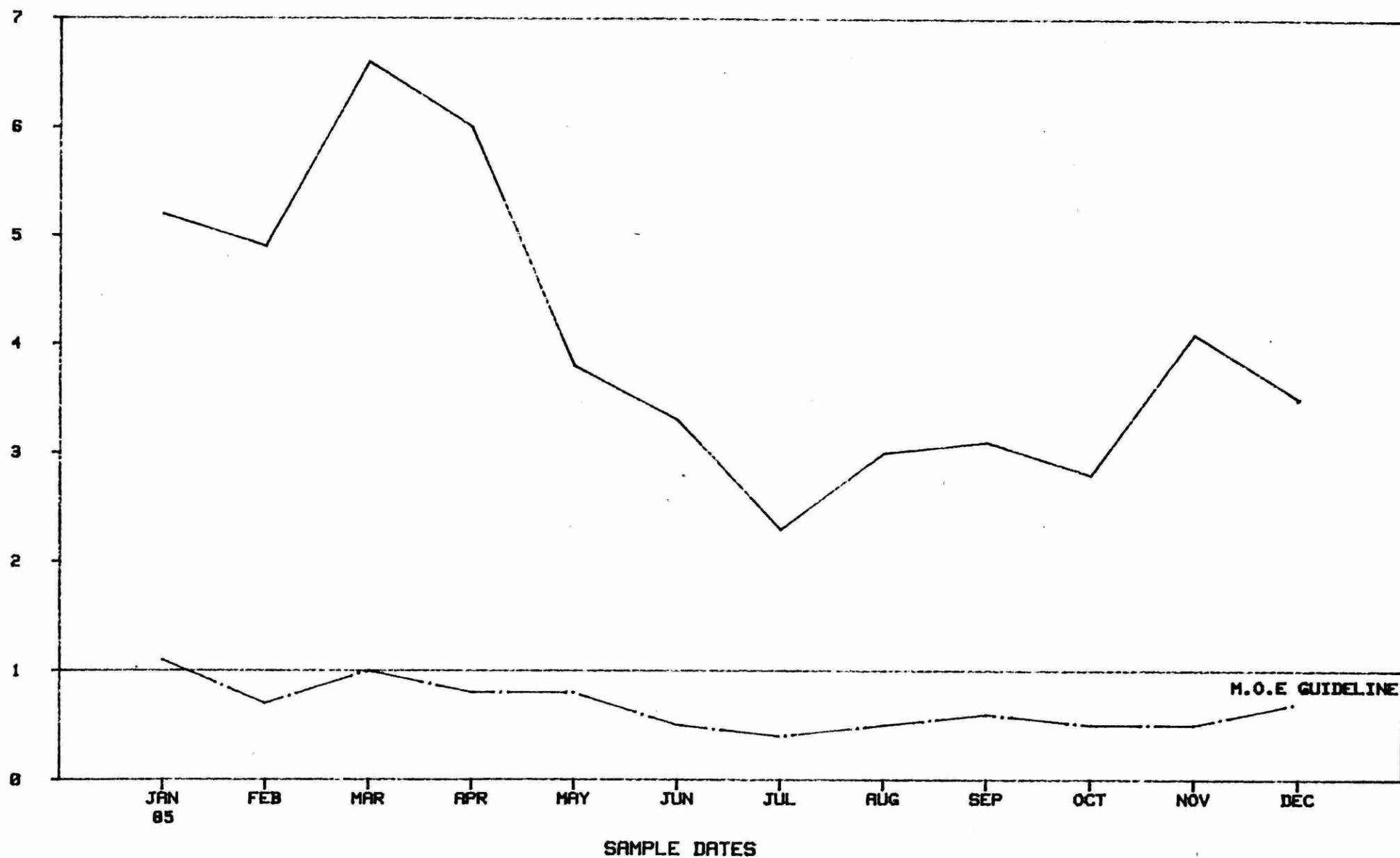
IGNACE W.P.C.P. 1985
INFLUENT VS. EFFLUENT
TOTAL PHOSPHORUS CONCENTRATIONS

AXIS

L
L

LEGEND

——— RAW SEWAGE - TOTAL P. - mg/l
- - - - - PLANT EFFLUENT - TOTAL P. - mg/l



IGNACE W.P.C.P. 1985
INFLUENT VS. EFFLUENT
TOTAL KJELDAHL NITROGEN CONCENTRATIONS

AXIS

L

L

LEGEND

RAIN SEWAGE - TKN

PLANT EFFLUENT - TKN

- mg/l

- mg/l



TOWN OF LONGLAC

BACKGROUND

Longlac is located on Highway #11, on the northshore of Long Lake, approximately 280 kilometers northeast of Thunder Bay.

The original sewage treatment plant began operation in 1972. Due to excessive hydraulic loading, an additional plant was added in 1980. The two plants have a combined capacity of $2.34 \times 10^3 \text{ m}^3$ per day and operate in the contact stabilization mode. The final effluent is discharged to the Making Ground River.

DATA REVIEW

The average daily flow for 1985 was $2.3 \times 10^3 \text{ m}^3$ which is 98% of the design capacity of $2.34 \times 10^3 \text{ m}^3$.

A review of the graph of average daily flow shows that the plant's design flow was exceeded in April, May and July to November. This suggests that there is an infiltration/extraneous flow problem with the collection system.

The plant treated a total of $840.833 \times 10^3 \text{ m}^3$ of sewage during the year.

The average BOD_5 concentration in the influent was 81.8 mg/l and the average BOD_5 concentration in the effluent was 12.5 mg/l. This represents a 83% reduction in BOD_5 levels in the plant process and is the efficiency expected of a contact stabilization plant. The plant satisfactorily met the Ministry of the Environment effluent quality guideline of 25 mg/l (or less) BOD_5 in the final effluent.

The average suspended solids concentration in the influent to the plant was 173.3 mg/l. The average effluent suspended solids concentration was 22.9 mg/l and represents an 86% removal efficiency. The Ministry of the Environment effluent quality guideline for suspended solids is 25 mg/l (or less) in the final effluent from a contact stabilization plant.

Total phosphorous levels in 1985 were reduced from an average influent concentration of 4.6 mg/l to an effluent level of 1.0 mg/l and represents a 77% reduction. Although not designed for phosphorous removal, and exempt from the requirement, this plant equalled the Ministry of the Environment effluent quality requirement of 1.0 mg/l (or less) total phosphorous in the final effluent.

It is conceivable that alum used at the water treatment plant and discharged periodically to the sewage system with sludge from the clarifiers is helping the sewage plant to achieve this reduction.

Total kjeldahl nitrogen levels were reduced from an average influent level of 23.2 mg/l to an effluent level of 8.7 mg/l, which is a 60% reduction. This decrease in TKN indicates that limited nitrification was occurring in the plant process. The Ministry of the Environment does not yet have an effluent quality guideline with respect to nitrogen.

The Longlac water pollution control plant successfully met the Ministry of the Environment effluent quality guidelines with respect to BOD₅ and suspended solids. The plant achieved a 83% reduction in BOD₅ and an 86% reduction in suspended solids. These levels of efficiency are to be expected from a contact stabilization plant.

SEWAGE TREATMENT - PERFORMANCE REPORT

WORKS NUMBER :110001042 LONGLAC W.P.C.P. LOSTP

MUNICIPALITY :LONGLAC

TREATMENT FACILITY : CONTACT STABILIZATION

REGION : 06 NORTHWESTERN
CURRENT POPULATION : 2329
POPULATION SERVED : 2329
PERCENT SERVED : 100OPERATING AUTHORITY : MINISTRY OF THE ENVIRONMENT
DESIGN CAPACITY : 2.34 10³M³/DAY DESIGN BOD5 : 150 MG/L

DESIGN SUSP. SOLIDS : 170 MG/L

THIS REPORT IS FOR THE YEAR 1985

← FLOW DATA					→← B O D 5 →←		S S		→← TOTAL P →←		→← T K N →	
DATE	TOTAL VOLUME 1000 M3	AVG DAY 1000 M3 /DAY	MAX DAY 1000 M3 /DAY	TOTAL WTP 1000 M3	INFLUENT MG/L	EFFLUENT MG/L	INFLUENT MG/L	EFFLUENT MG/L	INFLUENT MG/L	EFFLUENT MG/L	INFLUENT MG/L	EFFLUENT MG/L
January	44.669	1.441	1.840	48.620	133.0	7.5	183.0	21.6	6.7	0.8	30.0	7.9
February	40.191	1.435	1.718	66.140	90.0	45.0	150.0	70.0	6.9	2.6	31.5	16.3
March	59.433	1.917	4.177	58.250	77.0	14.0	330.0	52.5	4.2	1.4	23.0	16.0
April	89.615	2.967	4.263	51.090	53.0	7.8	95.0	22.5	3.3	0.7	20.0	9.9
May	78.826	2.543	4.263	37.879	68.0	7.0	110.0	10.0	4.2	1.4	21.0	13.0
June	65.856	2.195	3.032	39.180	72.0	4.8	130.0	1.5	4.5	0.6	23.5	9.0
July	77.090	2.487	3.737	48.200	65.0	8.6	177.0	8.3	3.6	0.5	20.7	5.1
August	96.907	3.126	5.359	43.680	52.0	8.7	140.0	10.5	2.8	0.8	12.5	3.4
September	78.662	2.622	8.195	N/A	70.0	8.2	280.0	9.0	5.0	0.9	25.0	15.0
October	87.201	2.813	4.091	33.608	64.0	10.0	65.0	20.0	2.7	0.5	13.0	4.5
November	72.729	2.424	3.973	N/A	50.0	15.0	75.0	4.0	2.8	0.8	16.0	4.0
December	49.654	1.602	1.895	N/A	133.0	9.6	245.0	17.5	6.2	0.7	31.0	3.7
TOTAL	840.833			426.647								
MAXIMUM			8.2		133.0	45.0	330.0	70.0	6.9	2.6	31.5	16.3
AVERAGE	70.1	2.3	3.9	47.41	81.8	12.5	173.3	22.9	4.6	1.0	23.2	8.7
TOTAL PERCENT REDUCTION					83.3		86.1		77.3		59.9	
NUMBER OF SAMPLES					22	21	21	21	22	21	22	21

LONGLAC W.P.C.P. 1985
TOTAL VOLUME

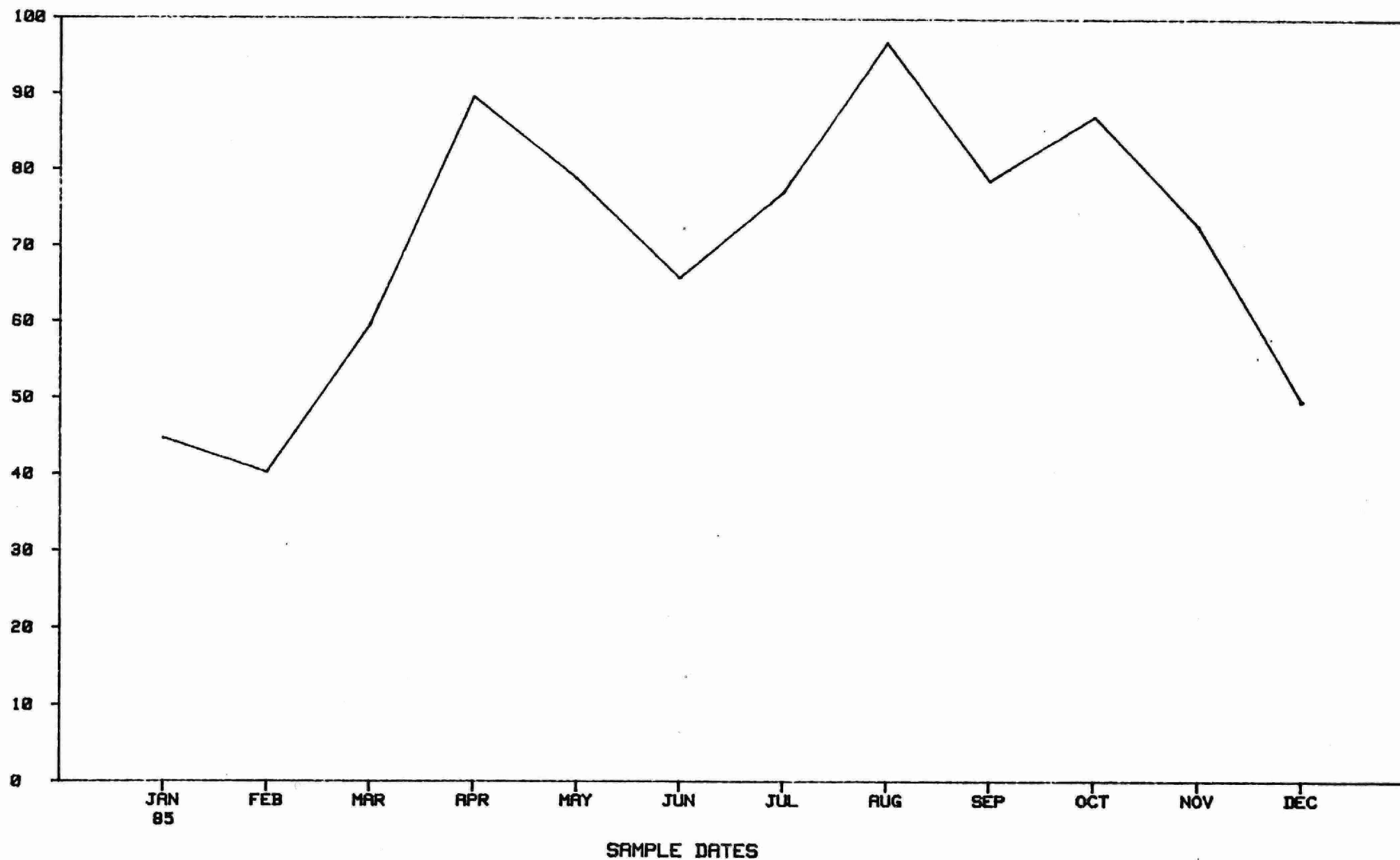
AXIS

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LEGEND

FLOW - TOTALVOL.

- 18-2m-8



LONGLAC W.P.C.P. 1985
AVERAGE DAILY FLOW

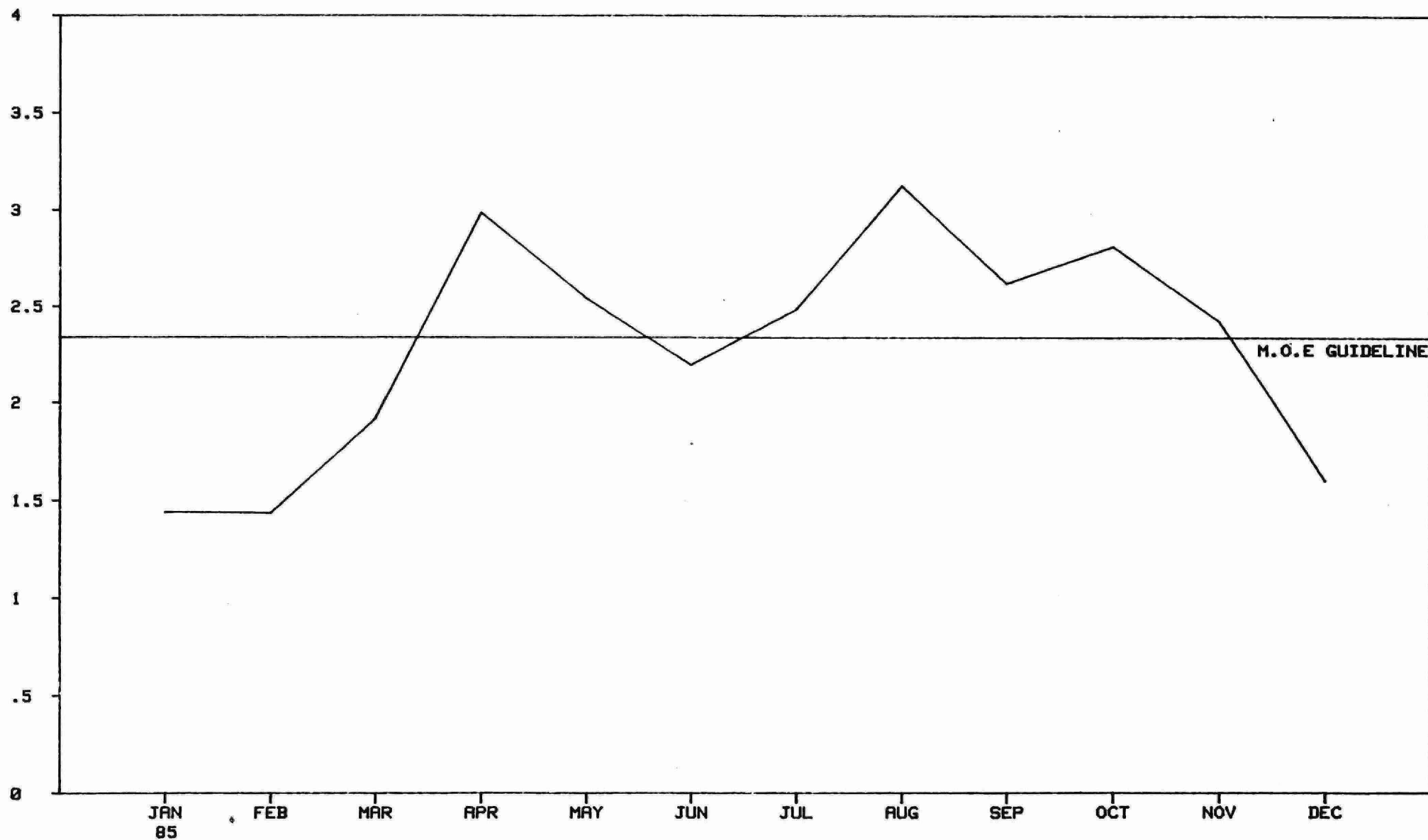
AXIS

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LEGEND

FLOW - AVG. DAILY

- 18-3m-3/d



SAMPLE DATES

LONGLAC W.P.C.P. 1985
 INFLUENT VS. EFFLUENT
 B.O.D. CONCENTRATIONS

AXIS

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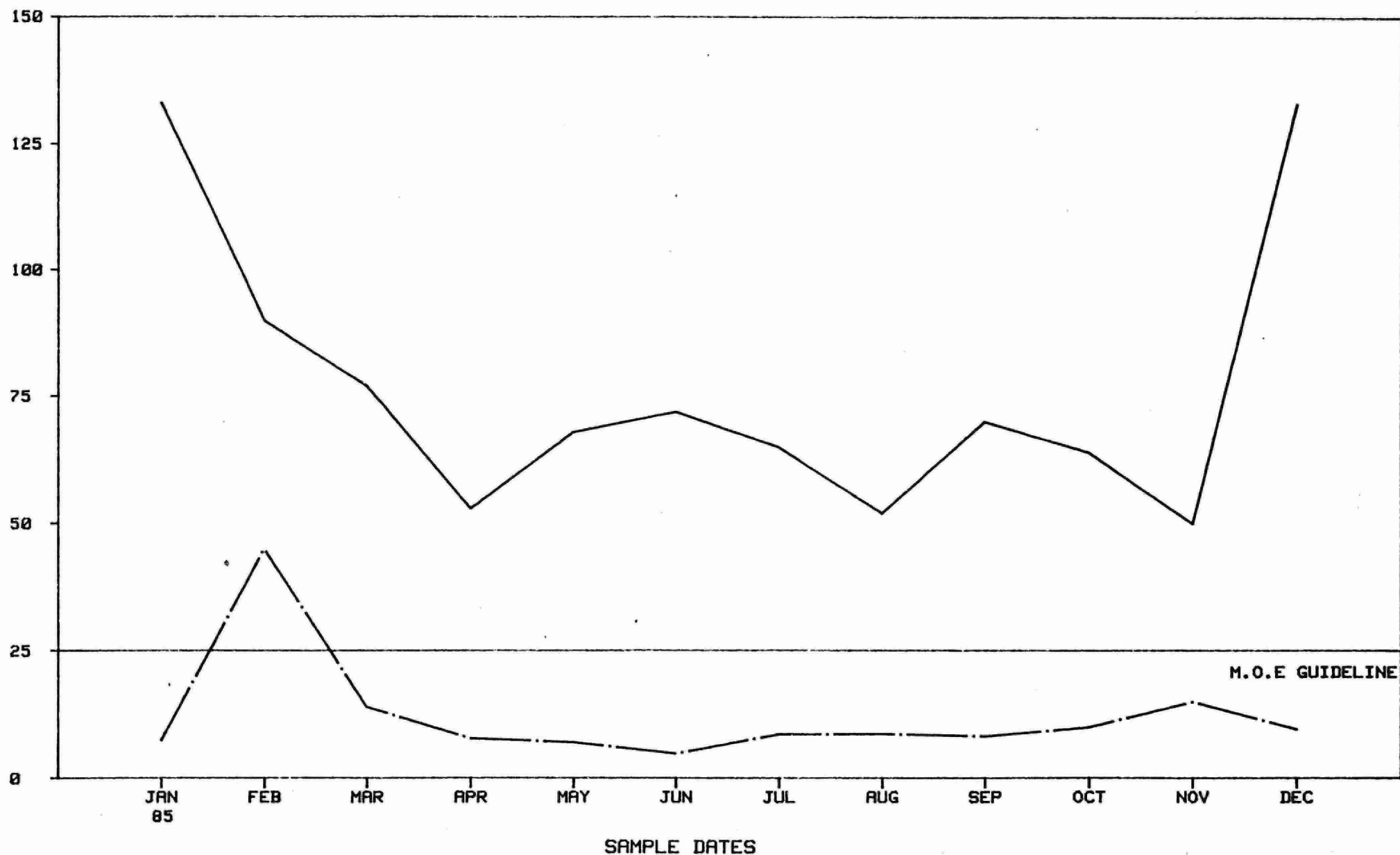
LEGEND

RAW SEWAGE - BOD

- mg/l

PLANT EFFLUENT - BOD

- mg/l



LONGLAC W.P.C.P. 1985
INFLUENT VS. EFFLUENT
SUSPENDED SOLIDS CONCENTRATIONS

AXIS

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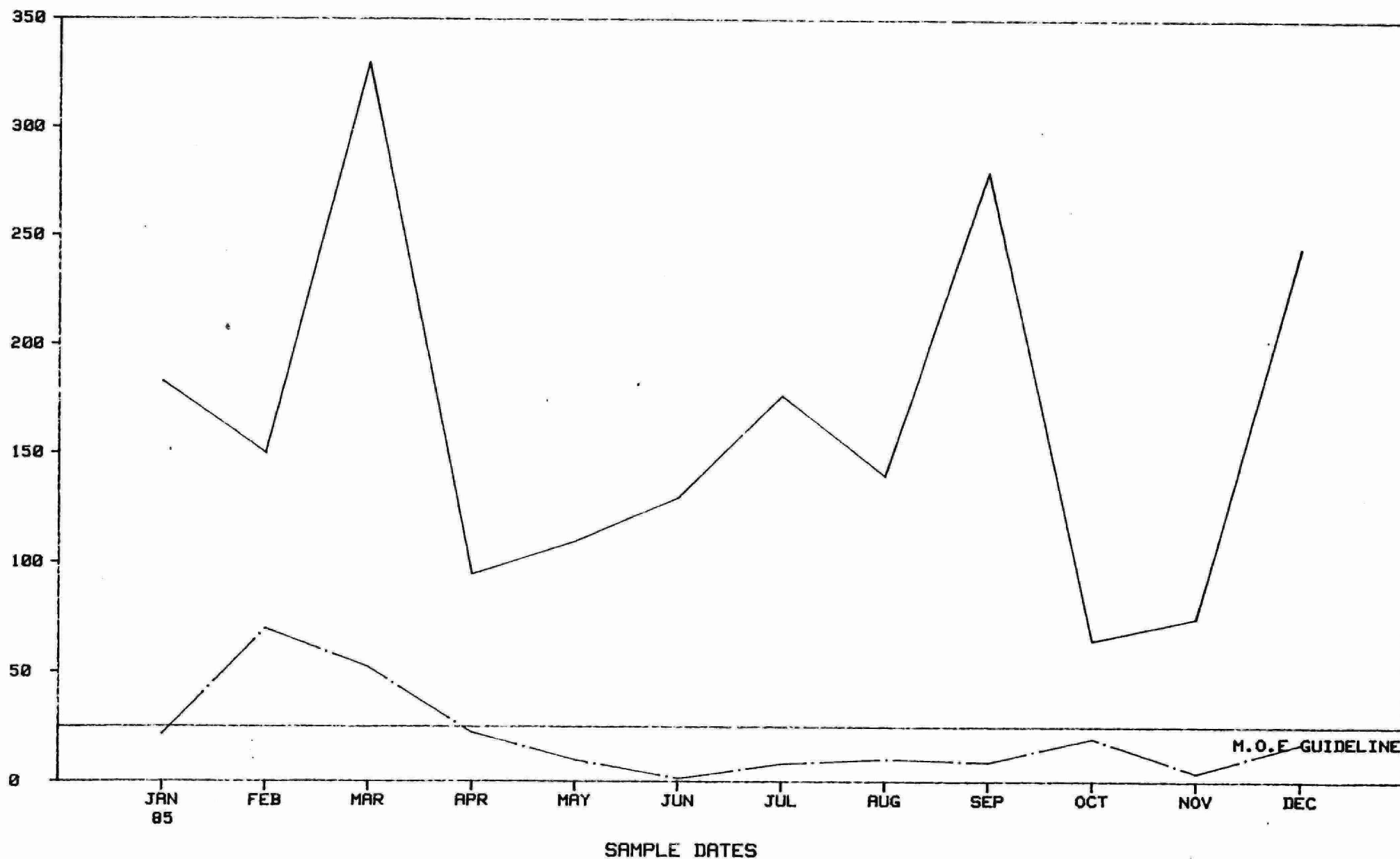
LEGEND

RAW SEWAGE - SS

PLANT EFFLUENT - SS

- mg/l

- mg/l



TOWNSHIP OF MARATHON

BACKGROUND

Marathon is located, on Highway 17, approximately 300 kilometres east of Thunder Bay, on the northshore of Lake Superior.

The plant commenced operation in June, 1982 and is an extended aeration plant with a design capacity of 1.998×10^3 m³ per day.

The treated effluent is discharged to Lake Superior.

The Marathon water pollution control plant is currently under expansion. This expansion is required due to the recent growth in the Hemlo area. The capacity is being increased to nearly 1.00×10^6 m³. Expansion is expected to be completed by the fall of 1986.

DATA REVIEW

The average daily flow received at the plant in 1985 was 1.5×10^3 m³ which is 75% of the design capacity of 1.998×10^3 m³. The plant treated an estimated total of 549.276×10^3 m³ of sewage.

The average BOD₅ concentration in the influent was 95.9 mg/l and the average BOD₅ concentration in the effluent was 2.1 mg/l. This represents a 97% reduction in BOD₅ levels in the plant process. The plant satisfactorily met the Ministry of the Environment effluent quality guideline for BOD₅ of 25 mg/l (or less) BOD₅ in the final effluent.

The Ministry of the Environment effluent quality guideline with respect to suspended solids of 25 mg/l (or less) was also met with an average concentration of 2.9 mg/l. This represents a 97% reduction from the average influent concentration of 145.4 mg/l.

Total phosphorous levels were reduced by 43% from an average influent concentration of 5.6 mg/l to an effluent level of 3.1 mg/l. The plant is not designed for phosphorous removal and is exempt from the Ministry of the Environment effluent quality requirement of 1 mg/l (or less) total phosphorous in the final effluent.

Total kjeldahl nitrogen was reduced by 94%, through the plant process, to an average effluent concentration of 1.6 mg/l. The Ministry of the Environment does not yet have an effluent quality guideline for nitrogen, however, a 94% reduction is considered excellent.

The Marathon water pollution control plant successfully met the Ministry of the Environment effluent quality guidelines with respect to BOD₅ and suspended solids. In addition, total kjeldahl nitrogen and total phosphorous concentrations were reduced by 94%. These are the performance levels to be expected from a satisfactorily operated extended aeration plant.

ONTARIO MINISTRY OF THE ENVIRONMENT
SEWAGE TREATMENT - PERFORMANCE REPORT

UTILITY MONITORING INFORMATION SYSTEM

REPORT TYPE 2

WORKS NUMBER : 120000471 MARATHON W.P.C.P. MRSTP

TREATMENT FACILITY : EXTENDED AERATION

MUNICIPALITY : MARATHON
REGION : 06 NORTHWESTERN
CURRENT POPULATION : 2317
POPULATION SERVED : 0
PERCENT SERVED : 0

OPERATING AUTHORITY : MINISTRY OF THE ENVIRONMENT
DESIGN CAPACITY : 1.998 10³ M³/DAY DESIGN BOD₅ : 170 MG/L

DESIGN SUSP. SOLIDS : 200 MG/L

THIS REPORT IS FOR THE YEAR 1985

DATE	FLOW DATA				BOD ₅		SS		TOTAL P		TKN	
	VOLUME 1000 M ³	INFLUENT MG/L	EFFLUENT MG/L	REDUCTION %	INFLUENT MG/L	EFFLUENT MG/L	INFLUENT MG/L	EFFLUENT MG/L	INFLUENT MG/L	EFFLUENT MG/L	INFLUENT MG/L	EFFLUENT MG/L
January	46.500	1.500	1.500	N/A	78.0	3.7	152.0	2.6	6.3	3.2	42.0	2.3
February	38.756	1.384	1.500	N/A	120.0	4.8	149.0	2.6	6.3	2.8	30.5	1.6
March	45.755	1.476	3.005	N/A	74.0	1.4	111.0	2.2	5.4	2.6	22.3	1.2
April	43.598	1.453	1.684	N/A	78.0	3.0	115.0	3.5	4.9	2.8	23.0	1.9
May	44.057	1.421	1.996	N/A	78.0	1.1	170.0	2.6	6.3	2.2	39.3	1.6
June	42.680	1.423	1.538	N/A	129.0	2.5	235.0	7.0	7.5	2.4	49.5	1.5
July	45.122	1.455	1.538	N/A	107.0	1.3	175.0	3.0	4.6	3.1	35.0	1.3
August	47.130	1.520	1.538	N/A	101.0	1.3	155.0	3.0	6.4	3.9	26.0	1.5
September	47.493	1.583	1.684	N/A	78.0	1.3	142.0	7.0	4.4	3.6	23.0	1.8
October	51.333	1.656	1.835	N/A	101.0	1.1	170.0	4.0	5.9	3.4	37.0	1.5
November	49.098	1.637	1.990	N/A	151.0	1.3	160.0	4.5	4.9	3.1	33.5	1.4
December	47.754	1.540	N/A	N/A	62.0	2.5	115.0	1.5	4.2	3.3	31.5	1.5
TOTAL	549.276			0.000								
MAXIMUM			3.0		151.0	4.8	235.0	7.0	7.5	3.9	49.5	2.3
AVERAGE	45.8	1.5	1.8	0.00	95.9	2.1	145.4	2.9	5.6	3.1	33.1	1.6
TOTAL PERCENT REDUCTION					97.6		97.7		43.5		94.7	
NUMBER OF SAMPLES					26	26	68	68	26	25	26	26

MARATHON W.P.C.P. 1985
TOTAL VOLUME

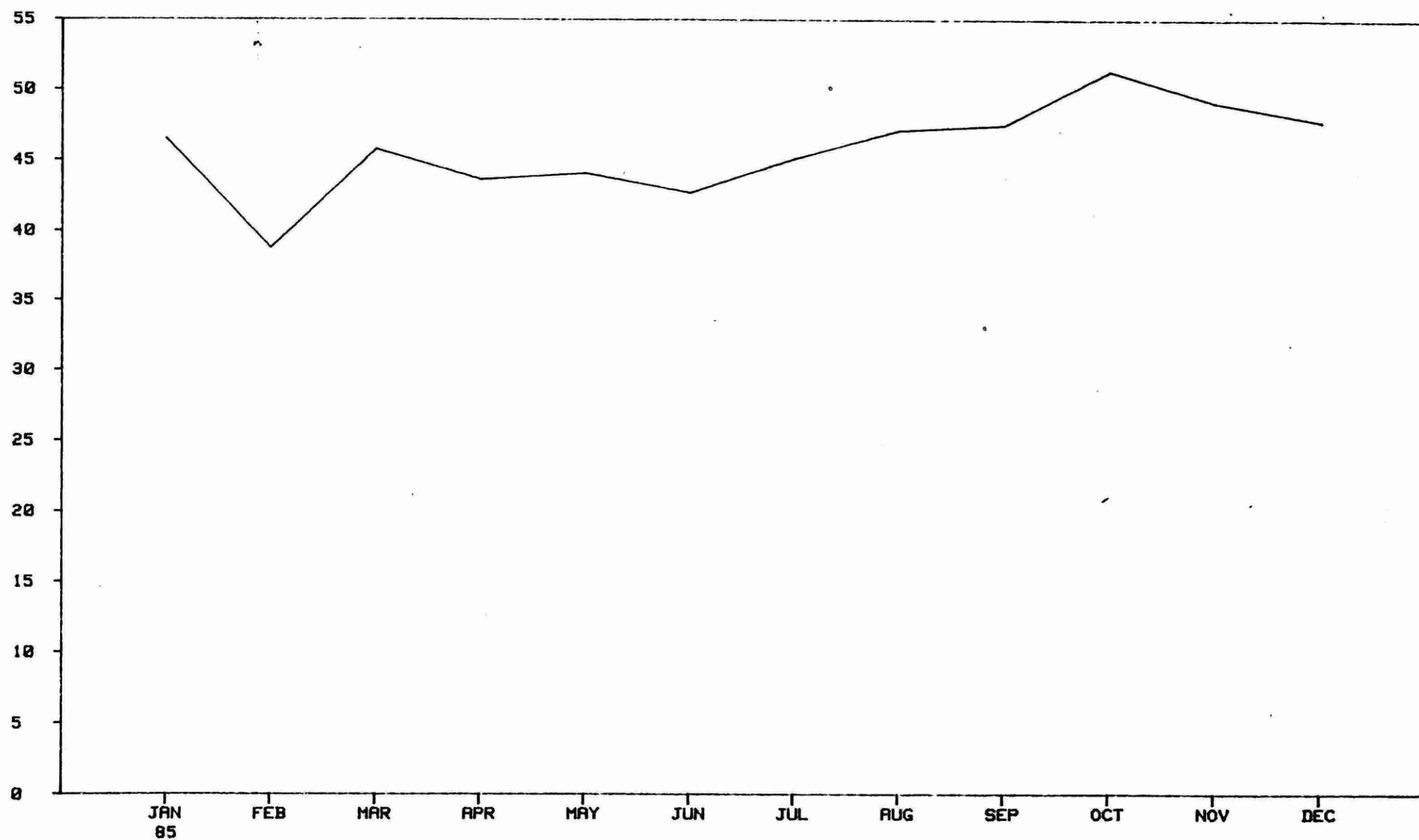
AXIS

L

LEGEND

FLOW - TOTALVOL.

- 18-3m-3



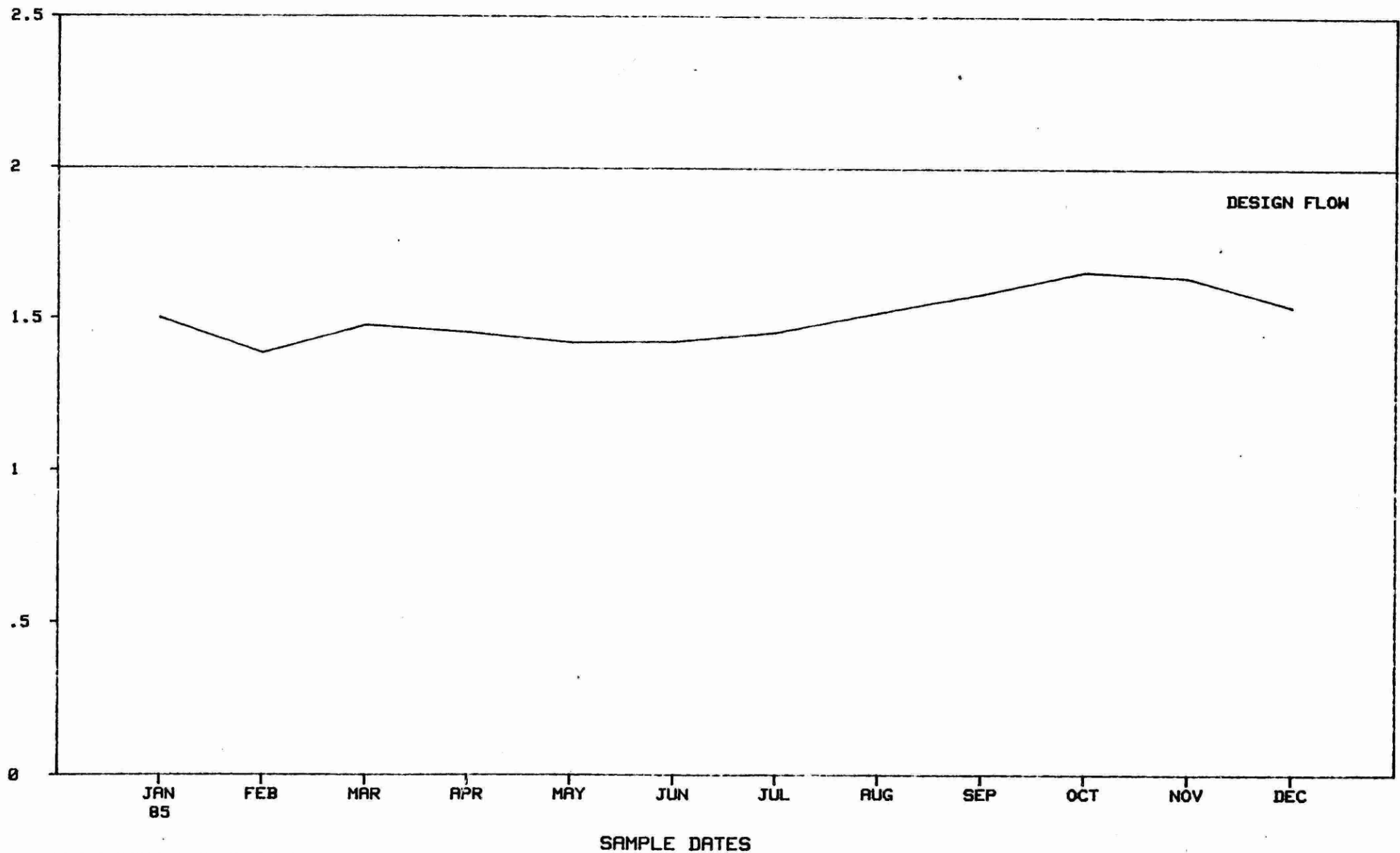
SAMPLE DATES

MARATHON W.P.C.P. 1985
AVERAGE DAILY FLOW

AXIS
L

LEGEND
FLOW - AVG. DAILY

- 18-3m-3/d



MARATHON W.P.C.P. 1985
INFLUENT VS. EFFLUENT
B.O.D. CONCENTRATIONS

AXIS

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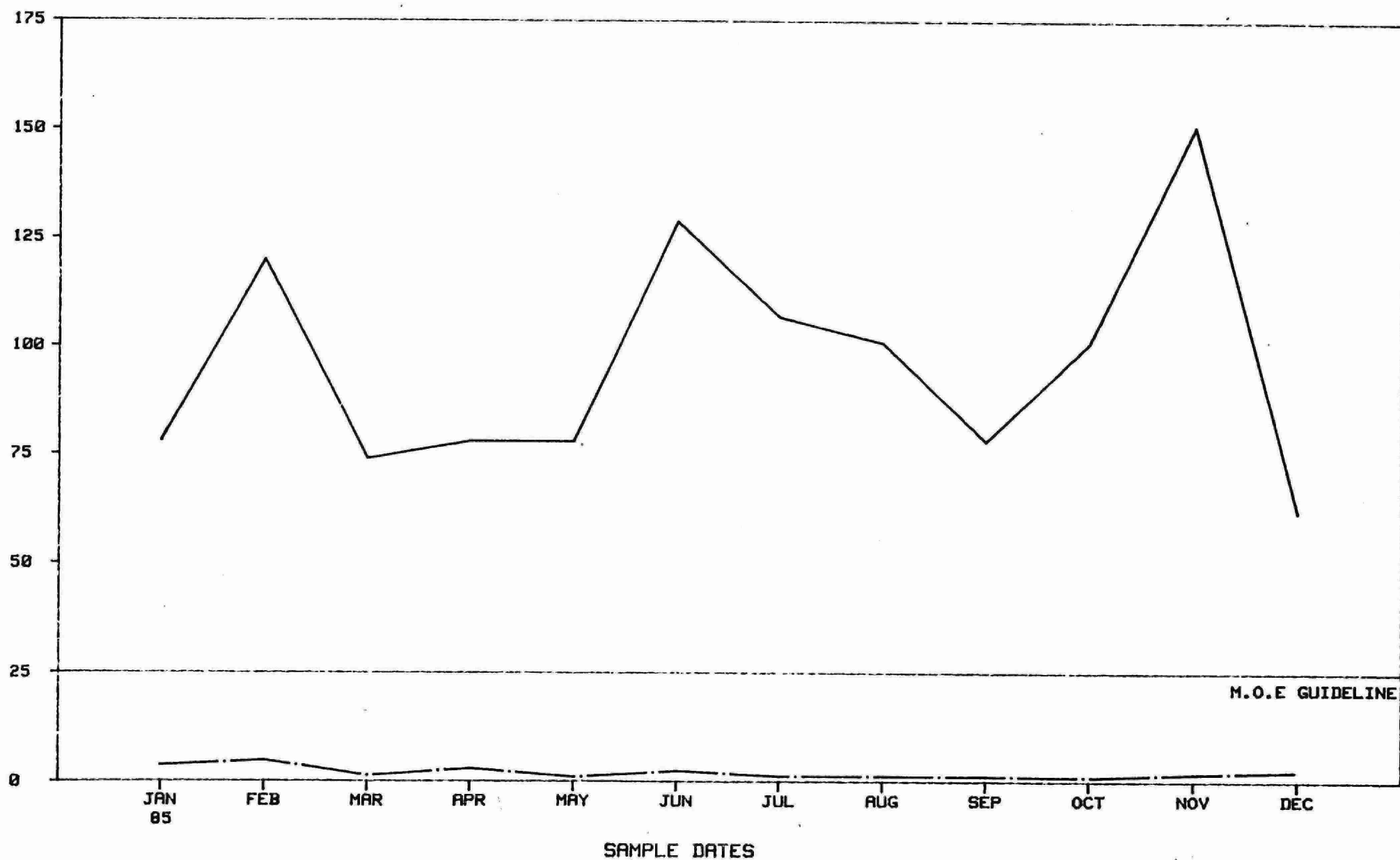
LEGEND

RAIN SEWAGE - BOD

- mg/l

PLANT EFFLUENT - BOD

- mg/l



MARATHON W.P.C.P. 1985
INFLUENT VS. EFFLUENT
SUSPENDED SOLIDS CONCENTRATIONS

AXIS

L

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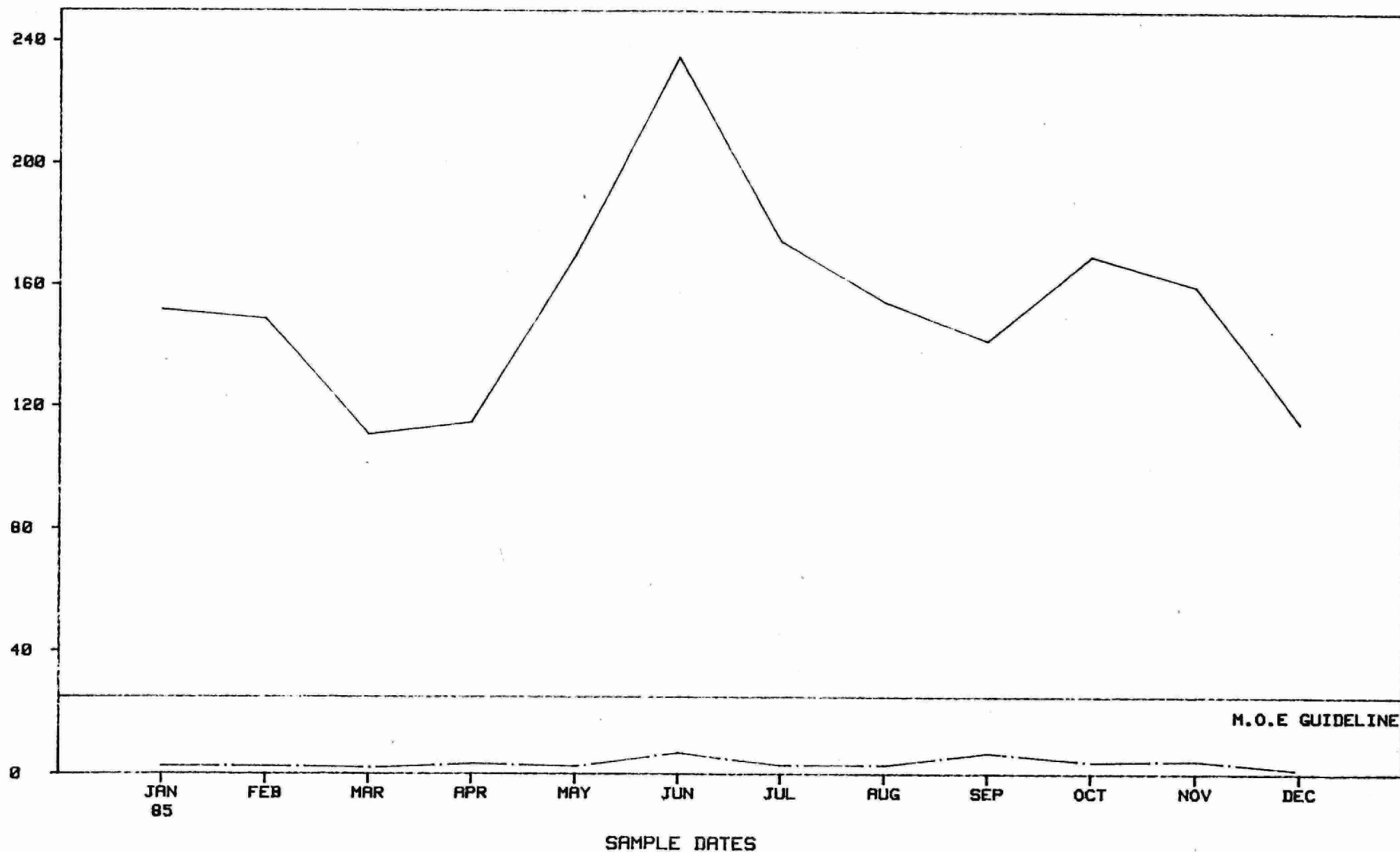
LEGEND

RAW SEWAGE - 88

PLANT EFFLUENT - 88

- mg/l

- mg/l



TOWNSHIP OF NAKINA

BACKGROUND

Nakina is located approximately 350 kilometres northeast of Thunder Bay and is accessible by road from Geraldton via Highway 584 and also by the Canadian National Railway mainline.

The plant, which began operation in 1980, is designed for phosphorous removal, through chemical precipitation, by the addition of liquid alum near the discharge end of the aeration section.

The effluent phosphorus requirement of 1.0 mg/l was relaxed at this facility for a one-year trial in July of 1985 as the receiving stream does not appear to require this additional protection. Phosphorus removal performance was in compliance prior to July.

The plant is operated as an extended aeration plant with a design capacity of $0.507 \times 10^3 \text{ m}^3$ per day. It is also capable of operating in the contact stabilization mode with a design capacity of $1.703 \times 10^3 \text{ m}^3$ per day. The treated effluent is discharged to Balkam Creek.

DATA REVIEW

The average daily flow for 1985 was $0.500 \times 10^3 \text{ m}^3$ which is 98% of the extended aeration mode design capacity. The plant treated a total of $170.8 \times 10^3 \text{ m}^3$ of sewage during the year.

Although operating near hydraulic overloaded, the plant was able to meet the Ministry of the Environment effluent quality guidelines of 25 mg/l (or less) for BOD_5 and 25 mg/l (or less) for suspended solids.

The BOD_5 removal efficiency was 95% with an average effluent concentration of 3.0 mg/l. The suspended solids removal efficiency was 92% with an average effluent concentration of 8.5 mg/l.

Prior to August, the average total phosphorous concentration of the influent was 4.0 mg/l and of the effluent was 0.9 mg/l. This is an 80% removal efficiency. The plant did meet the Ministry of the Environment effluent quality requirement of 1 mg/l (or less) total phosphorous in the final effluent prior to August.

Total kjeldahl nitrogen was reduced by 92% through the plant process. The Ministry of the Environment does not yet have an effluent quality guideline for nitrogen, however, a 92% reduction is considered to be excellent.

Although the Nakina water pollution control plant operated near capacity, it successfully met the Ministry of the Environment effluent quality guidelines with respect to BOD₅, suspended solids. Total kjeldahl nitrogen was reduced by 92% through the plant process. These efficiencies reflect a well operated extended aeration plant.

SEWAGE TREATMENT - PERFORMANCE REPORT

WORKS NUMBER :110003308 NAKINA W.P.C.P. NASTP

TREATMENT FACILITY : EXTENDED AERATION

MUNICIPALITY :NAKINA
REGION : 06 NORTHWESTERN
CURRENT POPULATION : 976
POPULATION SERVED : 976
PERCENT SERVED : 100

OPERATING AUTHORITY : MINISTRY OF THE ENVIRONMENT

DESIGN CAPACITY : .507 10³M³/DAY DESIGN BOD5 : 170 MG/L

DESIGN SUSP. SOLIDS : 200 MG/L

THIS REPORT IS FOR THE YEAR 1985

<- FLOW DATA -><- B O D 5 -><- S S -><- TOTAL P -><- T K N ->

DATE	TOTAL VOLUME 1000 M3	AVG DAY 1000 M3 /DAY	MAX DAY 1000 M3 /DAY	TOTAL WTP 1000 M3	INFLUENT MG/L	EFFLUENT MG/L	INFLUENT MG/L	EFFLUENT MG/L	INFLUENT MG/L	EFFLUENT MG/L	INFLUENT MG/L	EFFLUENT MG/L
January	10.690	0.345	0.417	17.701	125.0	3.2	199.0	10.0	5.9	0.9	33.0	2.8
February	10.176	0.363	0.439	23.990	71.0	4.7	105.0	12.5	4.9	0.7	29.0	3.8
March	12.735	0.411	0.564	26.165	112.0	3.0	230.0	15.0	3.5	0.7	32.5	1.9
April	16.466	0.549	0.851	19.800	65.0	3.0	128.0	10.5	3.2	0.9	27.5	1.9
May	19.475	0.628	0.944	21.113	85.0	2.3	115.0	7.0	6.0	1.5	28.0	1.6
June	14.945	0.498	0.962	19.648	58.0	2.4	88.0	7.5	4.4	0.9	25.0	1.5
July	12.786	0.412	0.549	18.100	31.0	2.0	53.0	3.7	2.0	0.9	14.6	1.4
August	15.726	0.507	0.873	17.227	140.0	2.5	250.0	4.0	6.1	1.8	26.5	1.3
September	12.681	0.423	0.624	15.750	71.0	1.4	135.0	10.0	4.2	2.6	32.0	2.1
October	16.664	0.538	0.706	16.193	64.0	6.1	108.0	7.0	4.8	3.6	26.5	2.1
November	15.873	0.529	0.758	N/A	53.0	2.4	73.0	6.0	3.2	1.9	23.5	1.4
December	12.668	0.409	0.485	N/A	90.0	2.8	160.0	12.5	4.2	3.0	22.5	2.1
TOTAL	170.885			195.687								
MAXIMUM			1.0		140.0	6.1	250.0	15.0	6.1	3.6	33.0	3.8
AVERAGE	14.2	0.5	0.7	19.57	82.0	3.0	138.5	8.5	4.4	1.6	26.7	2.0
TOTAL PERCENT REDUCTION					95.8		92.9		60.7		92.4	
NUMBER OF SAMPLES					27	26	27	26	26	26	27	26

NAKINA W.P.C.P. 1985
TOTAL VOLUME

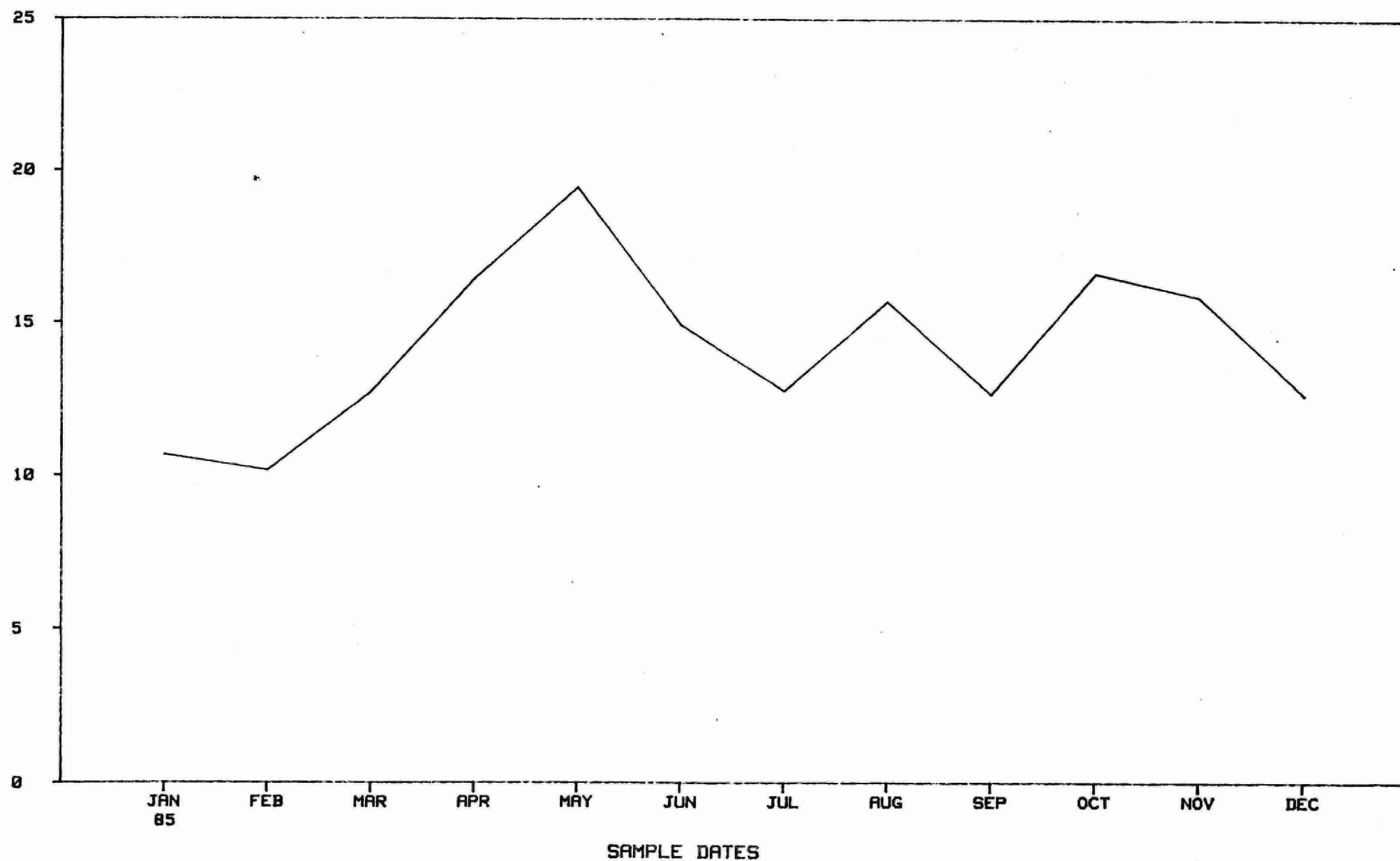
AXIS

L

LEGEND

FLOW - TOTAL VOL.

- 18-3m-3



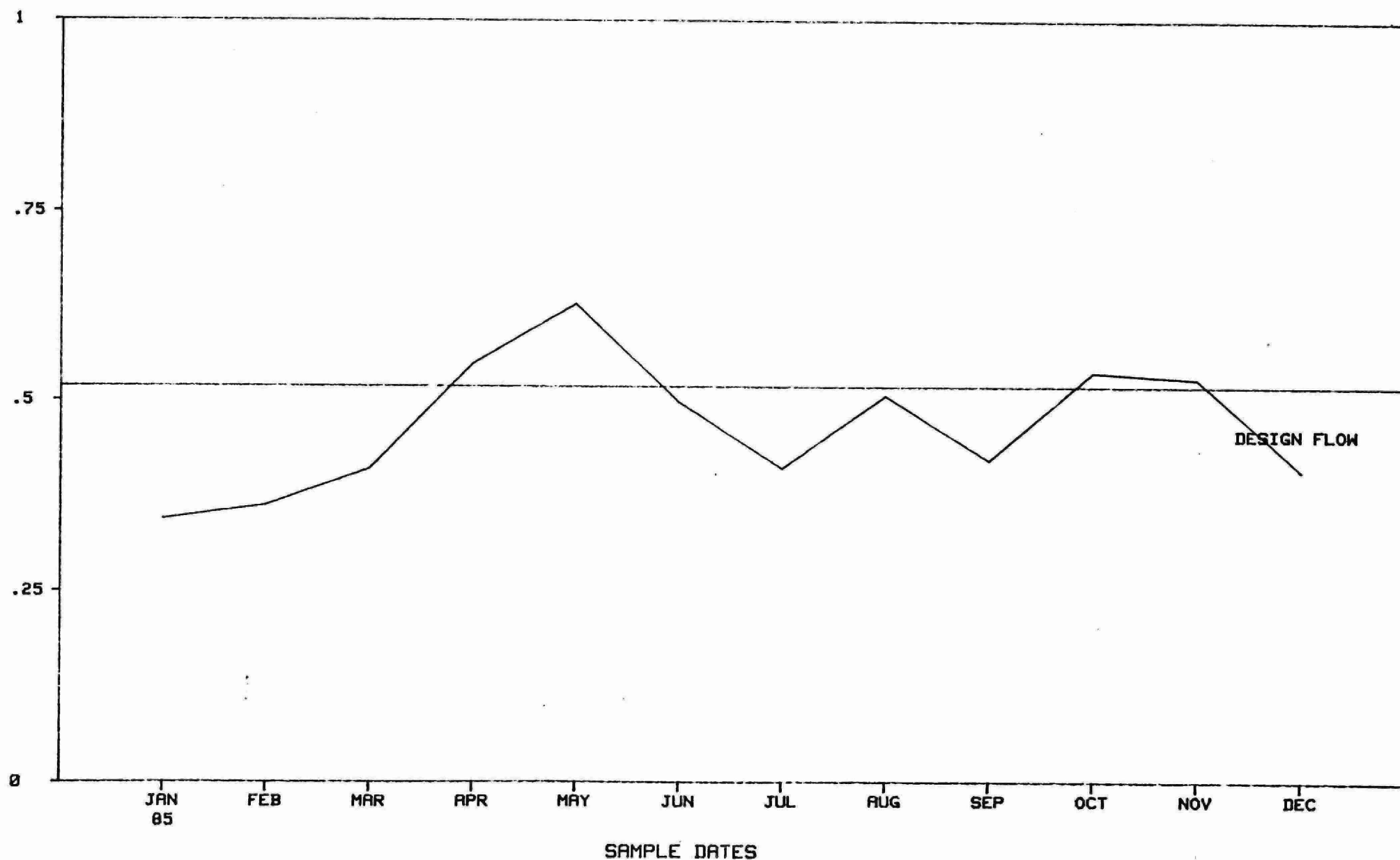
NAKINA W.P.C.P. 1985
AVERAGE DAILY FLOW

AXIS
L

LEGEND

— FLOW - AVG. DAILY

- 18-3m-3/d



NAKINA W.P.C.P. 1985
INFLUENT VS. EFFLUENT
B.O.D. CONCENTRATIONS

AXIS

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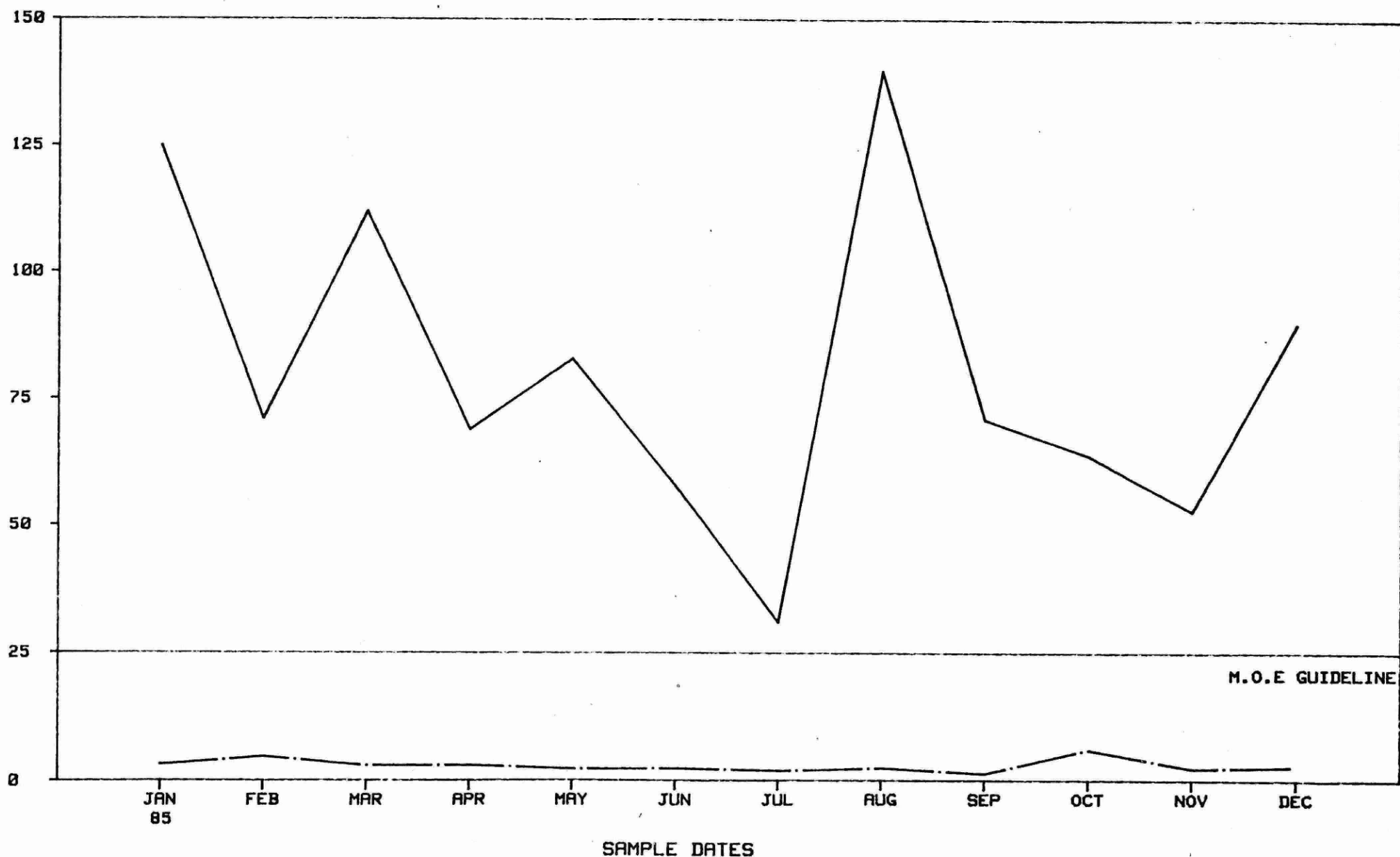
LEGEND

RAW SEWAGE - BOD

PLANT EFFLUENT - BOD

- mg/l

- mg/l



NAKINA W.P.C.P. 1985
INFLUENT VS. EFFLUENT
SUSPENDED SOLIDS CONCENTRATIONS

AXIS

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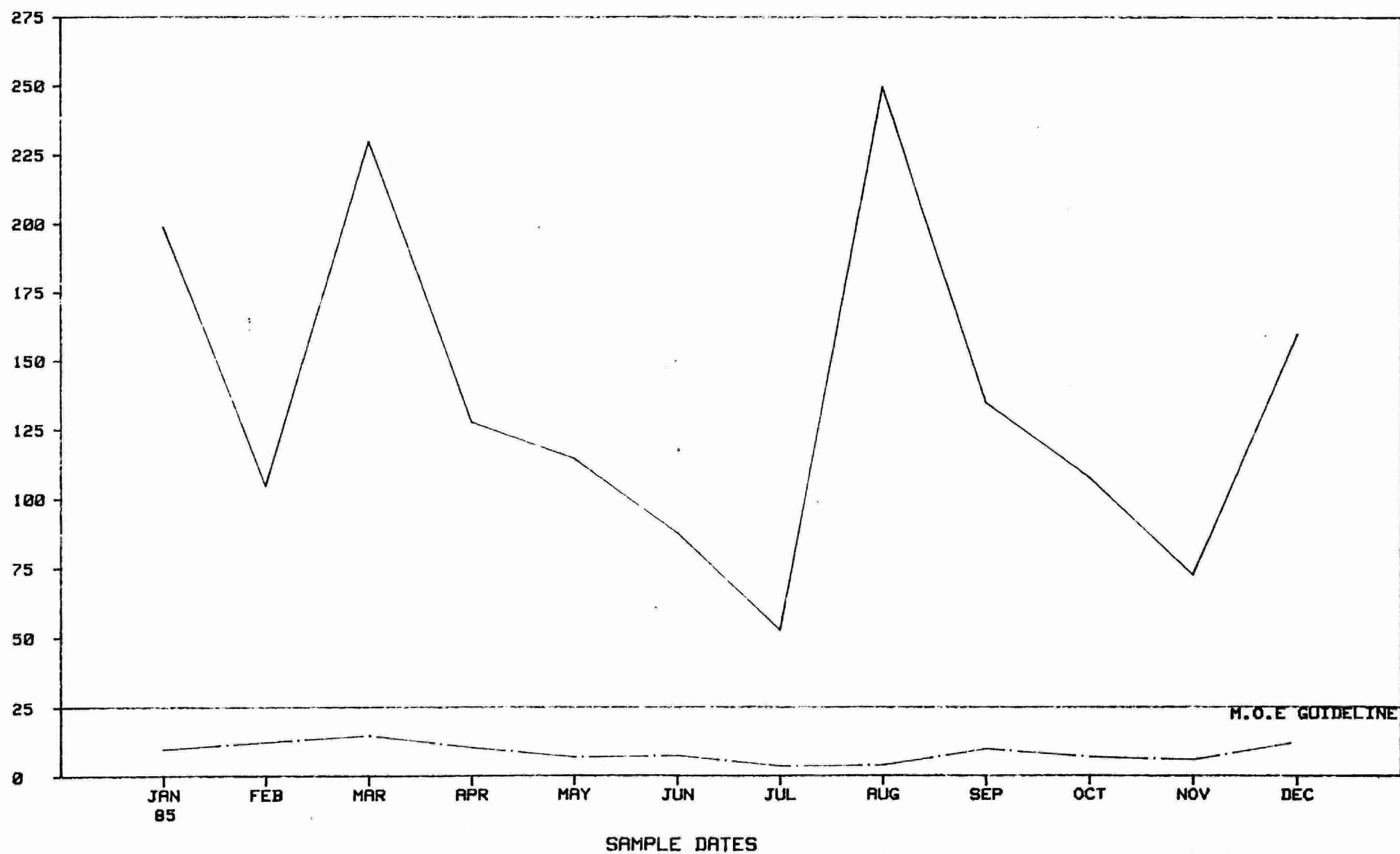
LEGEND

RAW SEWAGE - SS

- mg/l

PLANT EFFLUENT - SS

- mg/l



TOWNSHIP OF PICKLE LAKE

BACKGROUND

Pickle Lake is located on Highway 599, 370 air kilometres north of Thunder Bay.

The Pickle Lake water pollution control plant was constructed in 1977 as a joint venture between Government agencies and Union Miniere Explorations and Mining Corporation Limited (UMEX).

The plant, operated by the Ministry of the Environment, is an extended aeration plant with a design capacity of $0.9 \times 10^3 \text{ m}^3$ per day. The final effluent is discharged to the Kawinogans River.

DATA REVIEW

The plant's utility monitoring system data for 1985 shows that the average daily flow was $0.3 \times 10^3 \text{ m}^3$ which is 33.3% of the plant's design capacity of $0.9 \times 10^3 \text{ m}^3$. Although considerably less than the design capacity, this equates to 0.75 m^3 per capita per day (165 gallons per capita per day) based on the 1985 population of 400 people. This is excessive and suggests that an infiltration problem exists. The plant treated an approximate total of $104.480 \times 10^3 \text{ m}^3$ of sewage in 1985. An accurate figure is not available due to incomplete data for October.

The average BOD_5 concentration of the influent was 16.6 mg/l and the average concentration of the effluent was 3.0 mg/l . This represents an 80% removal efficiency in the plant process. This level of removal is to be expected from an extended aeration plant. The plant met the Ministry of the Environment effluent quality guideline of 25 mg/l (or less) BOD_5 in the final effluent.

Normally, raw sewage has a BOD_5 concentration in the range of 100-120 mg/l. The low BOD_5 concentration (average 16.6 mg/l) received at the plant again suggests an infiltration problem.

The average suspended solids concentrations in the influent and effluent were 34.7 mg/l, and 7.2 mg/l, respectively. This is a 74% reduction in suspended solids through the plant process and met the Ministry of the Environment effluent quality guideline of 25 mg/l (or less) suspended solids in the final effluent.

The average total phosphorous concentration in the influent for 1985 was 0.9 mg/l and the average concentration in the effluent was 1.3 mg/l, which is a 44% increase (this is an anomaly in testing results, as phosphorous is reduced in the treatment process). The low levels in the influent are suspected to be the result of dilution by infiltration.

This plant is exempt from the Ministry of the Environment effluent quality requirement of 1 mg/l (or less) total phosphorous in the final effluent.

The average total kjeldahl nitrogen concentration in the influent was 6.4 mg/l. The final effluent had an average concentration of 1.7 mg/l, which is a 68% reduction. This decrease in total kjeldahl nitrogen indicates that some nitrification was occurring in the plant process. The Ministry of the Environment does not, as yet, have an effluent quality guideline with respect to nitrogen.

The Pickle Lake water pollution control plant successfully met the Ministry of the Environment effluent quality guidelines with respect to BOD_5 and suspended solids. It is doubtful, due to the high infiltration, that the plant would be able to sustain these effluent levels should the population increase to design level.

SEWAGE TREATMENT - PERFORMANCE REPORT

WORKS NUMBER : 110002185 PICKLE LAKE W.P.C.P. PISTP

MUNICIPALITY : PICKLE LAKE
REGION : 06 NORTHWESTERN
CURRENT POPULATION : 325
POPULATION SERVED : 325
PERCENT SERVED : 100

TREATMENT FACILITY : EXTENDED AERATION

OPERATING AUTHORITY : MINISTRY OF THE ENVIRONMENT

DESIGN CAPACITY : .909 10³M³/DAY DESIGN 8005 : 170 MG/L

DESIGN SUSP. SOLIDS : 200 MG/L

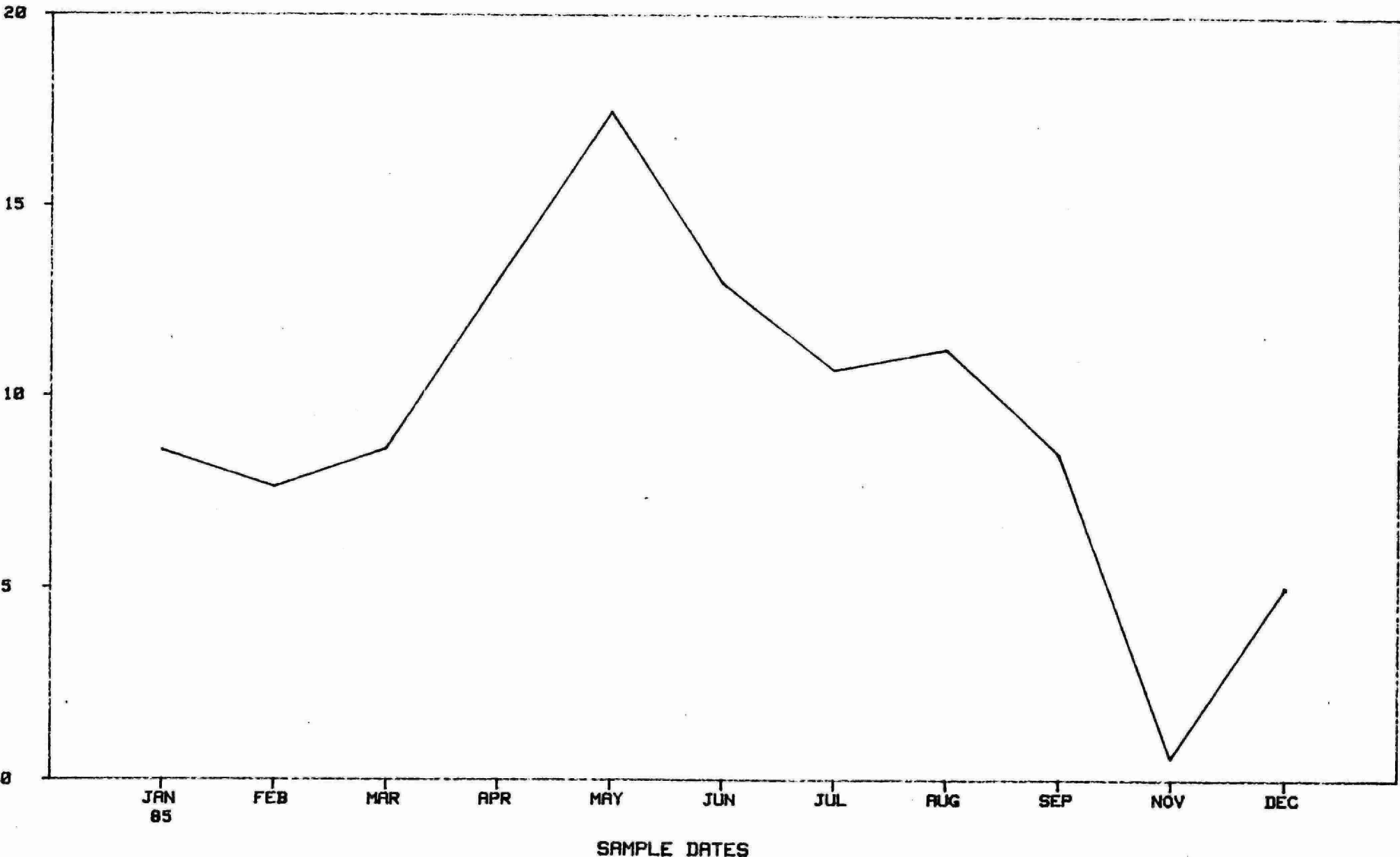
THIS REPORT IS FOR THE YEAR 1985

<- FLOW DATA -><- B O D 5 -><- S S -><- TOTAL P -><- T K N ->

DATE	TOTAL VOLUME 1000 M3	AVG DAY 1000 M3 /DAY	MAX DAY 1000 M3 /DAY	TOTAL WTP 1000 M3	INFLUENT MG/L	EFFLUENT MG/L	INFLUENT MG/L	EFFLUENT MG/L	INFLUENT MG/L	EFFLUENT MG/L	INFLUENT MG/L	EFFLUENT MG/L
January	8.582	0.276	0.373	10.540	24.0	2.6	40.0	20.0	1.4	1.4	8.9	1.3
February	7.637	0.272	0.336	10.090	12.0	3.7	33.0	15.0	0.8	2.0	6.0	2.8
March	8.640	0.279	0.328	12.011	23.0	0.9	25.0	9.0	0.8	1.7	7.0	1.8
April	13.070	0.440	0.811	12.600	25.0	5.9	50.0	6.0	1.1	1.8	4.0	2.8
May	17.476	0.558	0.759	16.680	10.0	7.5	32.0	4.0	0.6	0.9	6.7	1.1
June	12.988	0.430	0.625	15.920	20.0	1.6	25.0	1.5	1.0	1.0	6.6	1.0
July	10.703	0.340	0.471	24.170	7.0	1.2	10.0	2.0	0.6	1.0	4.4	2.3
August	11.250	0.360	0.516	33.120	12.0	1.7	28.0	5.5	0.7	1.2	3.8	1.2
September	8.520	0.300	0.457	N/A	18.0	1.8	57.0	5.5	1.3	1.2	10.6	1.3
October	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
November	0.587	0.200	0.244	N/A	20.0	1.8	50.0	1.0	0.8	1.0	6.2	1.0
December	5.027	0.160	0.199	N/A	12.0	1.0	17.0	11.5	0.7	1.0	3.0	4.0
TOTAL	104.480			135.131								
MAXIMUM			0.8		25.0	7.5	57.0	20.0	1.4	2.0	10.7	2.9
AVERAGE	9.5	0.3	0.5	16.89	16.6	3.0	34.7	7.2	0.9	1.3	6.4	1.7
TOTAL PERCENT REDUCTION					80.8		74.5		0.7		63.3	
NUMBER OF SAMPLES					18	18	18	18	18	18	18	18

PICKLE LAKE W.P.C.P. 1985
TOTAL VOLUME

AXIS
L ———— FLOW - TOTALVOL. - 10-2-85



PICKLE LAKE W.P.C.P. 1985
AVERAGE DAILY FLOW

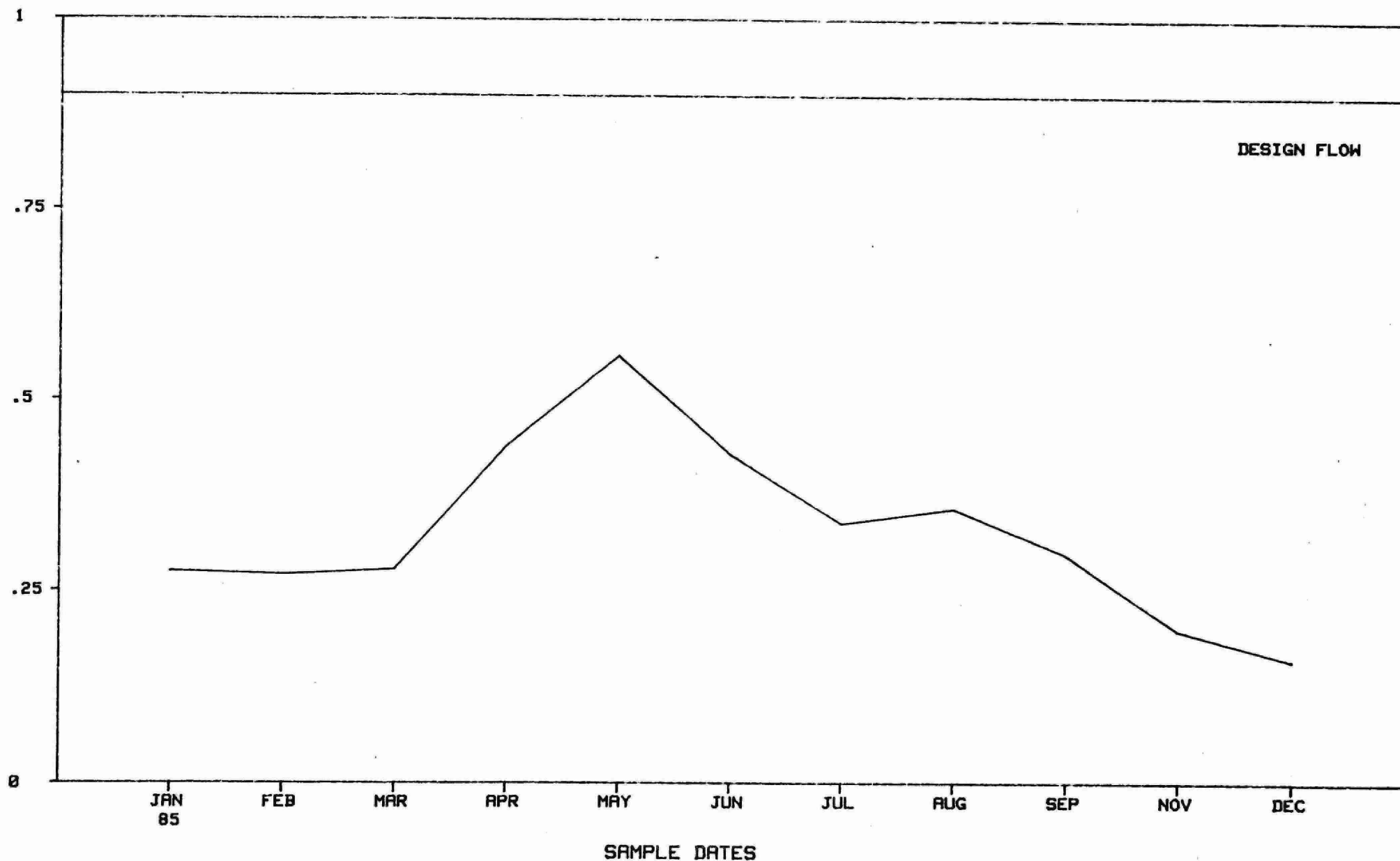
AXIS

L

LEGEND

FLOW - AVG. DAILY

- 18-3m-3/d



PICKLE LAKE W.P.C.P. 1985
INFLUENT VS. EFFLUENT
B.O.D. CONCENTRATIONS

AXIS

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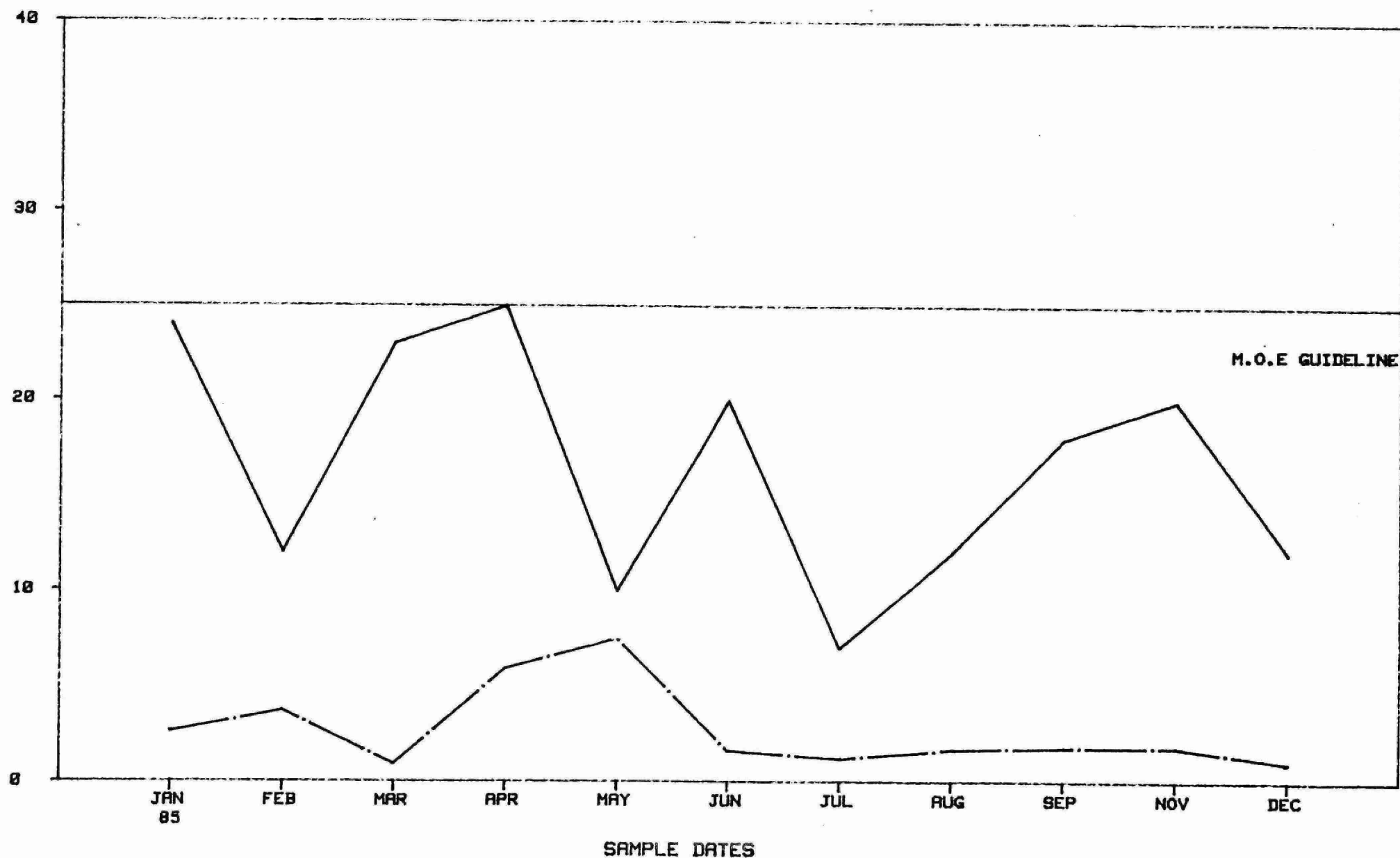
LEGEND

RAW SEWAGE - BOD

- mg/l

PLANT EFFLUENT - BOD

- mg/l



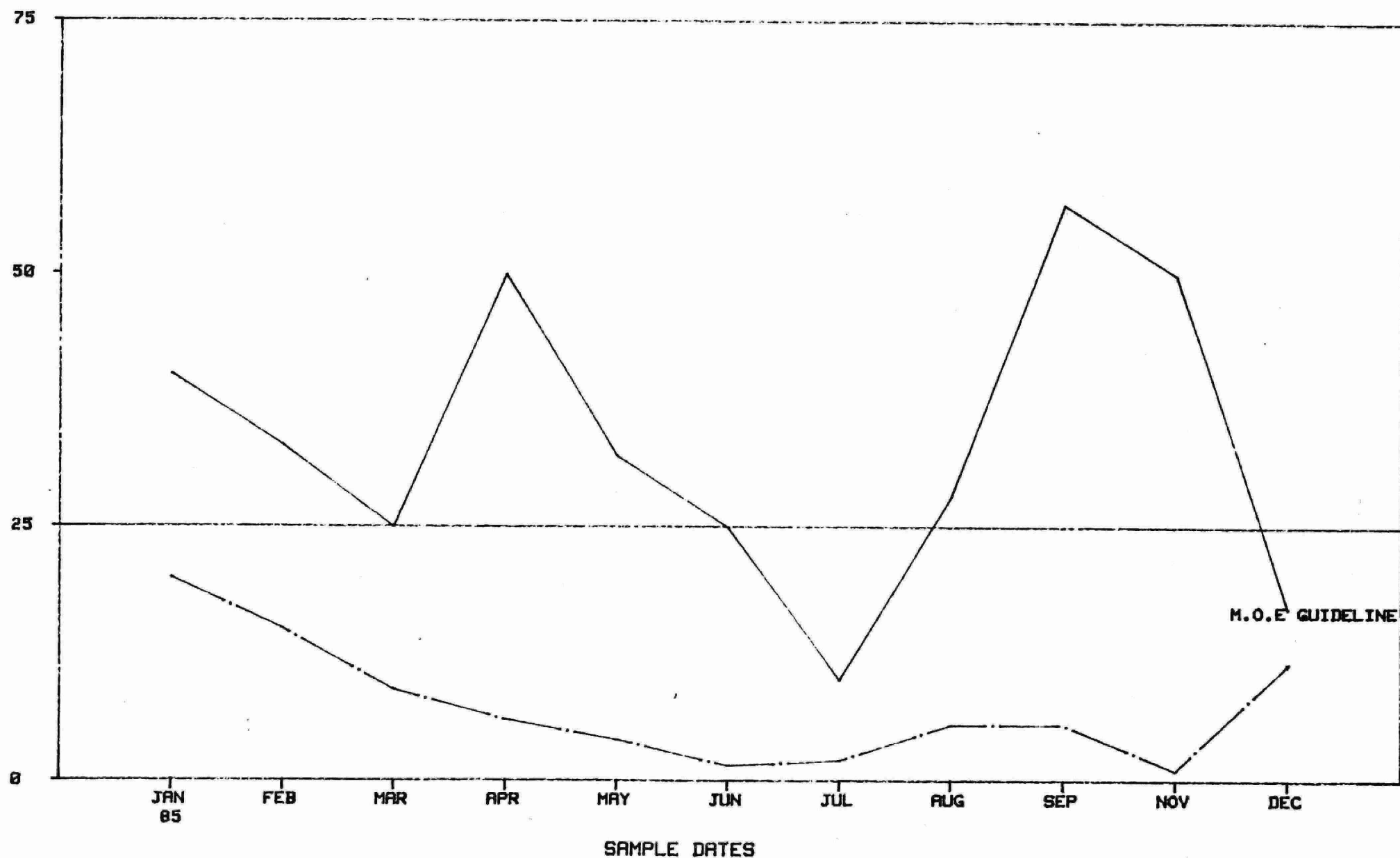
PICKLE LAKE W.P.C.P. 1985
INFLUENT VS. EFFLUENT
SUSPENDED SOLIDS CONCENTRATIONS

AXIS

L

LEGEND

—— RPH SEWAGE - 88 - mg/l
—— PLANT EFFLUENT - 88 - mg/l



TOWNSHIP OF SCHREIBER

BACKGROUND

The Township of Schreiber is located approximately 210 kilometres east of Thunder Bay on Highway 17.

The plant, placed into service in 1975, is capable of operating in either the contact stabilization mode or extended aeration mode.

The design capacity for the extended aeration mode is $0.73 \times 10^3 \text{ m}^3$ per day and for the contact stabilization mode it is $1.135 \times 10^3 \text{ m}^3$ per day.

The treated effluent is discharged to Lake Superior via Cooks Creek.

DATA REVIEW

The Schreiber water pollution control plant was operated in the extended aeration mode in 1985. The average daily flow to the plant was $0.800 \times 10^3 \text{ m}^3$ which is 109% of the design capacity of $0.73 \times 10^3 \text{ m}^3$. A total of $309.526 \times 10^3 \text{ m}^3$ of sewage was treated in 1984.

The plant achieved a 79% efficiency in BOD_5 removal in 1985 with an average effluent concentration of 20.4 mg/l. The plant met the Ministry of the Environment effluent quality guideline of 25 mg/l (or less) BOD_5 in the final effluent.

The average suspended solids concentrations in the influent and effluent were 128.2 mg/l, and 20.5 mg/l, respectively. This represents an 83% reduction in suspended solids through the plant process and met the Ministry of the Environment effluent quality guideline of 25 mg/l (or less) suspended solids in the final effluent.

The total phosphorous and total kjeldahl nitrogen levels were reduced 53% and 78% respectively to effluent concentrations of 2.4 mg/l and 7.7 mg/l respectively.

The Schreiber plant is exempt from the Ministry of the Environment total phosphorous requirement. An effluent quality guideline for nitrogen has not yet been established in the province.

The Schreiber water pollution control plant successfully met the Ministry of the Environment effluent quality guidelines with respect to BOD₅ and suspended solids.

SEWAGE TREATMENT - PERFORMANCE REPORT

WORKS NUMBER : 110002112 SCHREIBER W.P.C.P. SCSTP

MUNICIPALITY : SCHREIBER
REGION : 06 NORTHWESTERN
CURRENT POPULATION : 1937
POPULATION SERVED : 1937
PERCENT SERVED : 100

TREATMENT FACILITY : EXTENDED AERATION

OPERATING AUTHORITY : MINISTRY OF THE ENVIRONMENT

DESIGN CAPACITY : 1.137 10³ M³/DAY DESIGN BOD5 : 170 MG/L

DESIGN SUSP. SOLIDS : 200 MG/L

THIS REPORT IS FOR THE YEAR 1985

<- FLOW DATA -> <- BOD5 -> <- SS -> <- TOTAL P -> <- TKN ->

DATE	TOTAL VOLUME 1000 M3	AVG DAY 1000 M3 /DAY	MAX DAY 1000 M3 /DAY	TOTAL WTP 1000 M3	INFLUENT MG/L	EFFLUENT MG/L	INFLUENT MG/L	EFFLUENT MG/L	INFLUENT MG/L	EFFLUENT MG/L	INFLUENT MG/L	EFFLUENT MG/L
January	20.581	0.664	1.405	61.100	79.0	30.0	110.0	22.5	5.6	2.0	43.5	6.7
February	20.761	0.740	0.900	62.790	100.0	51.0	155.0	22.5	5.5	1.9	43.0	10.5
March	22.573	0.728	0.880	66.060	90.0	36.0	140.0	15.0	5.0	1.2	40.0	11.0
April	22.029	0.734	0.882	62.050	102.0	22.0	130.0	20.0	6.5	2.3	42.0	15.0
May	28.817	0.930	1.610	60.720	109.0	10.0	193.0	17.3	5.3	2.1	59.7	14.0
June	22.999	0.767	1.060	74.410	89.0	10.0	104.0	15.3	4.5	2.2	26.3	15.5
July	25.123	0.810	1.020	81.490	104.0	16.8	117.0	20.0	4.7	3.5	26.8	5.5
August	26.680	0.861	1.081	N/A	183.0	6.7	150.0	12.0	5.3	2.3	28.5	2.0
September	25.051	0.835	0.998	55.400	83.0	15.2	105.0	13.8	4.0	2.5	23.5	2.7
October	29.695	0.958	2.085	60.240	99.0	14.9	118.0	17.8	4.0	2.5	30.3	3.1
November	34.688	1.156	2.330	N/A	115.0	14.3	108.0	35.0	4.6	1.8	32.0	3.3
December	30.529	0.985	1.224	N/A	116.0	18.0	128.0	29.0	4.1	2.3	25.0	3.3
TOTAL	309.526			584.260								
MAXIMUM		2.9			183.0	51.0	193.0	35.0	6.5	3.5	59.7	15.5
AVERAGE	25.8	0.8	1.3	64.92	104.5	16.1	128.2	20.5	4.9	2.4	34.1	7.7
TOTAL PERCENT REDUCTION					79.0		83.9		53.5		78.5	
NUMBER OF SAMPLES					29	52	30	42	30	47	30	47

SCHREIBER W.P.C.P. 1985
TOTAL VOLUME

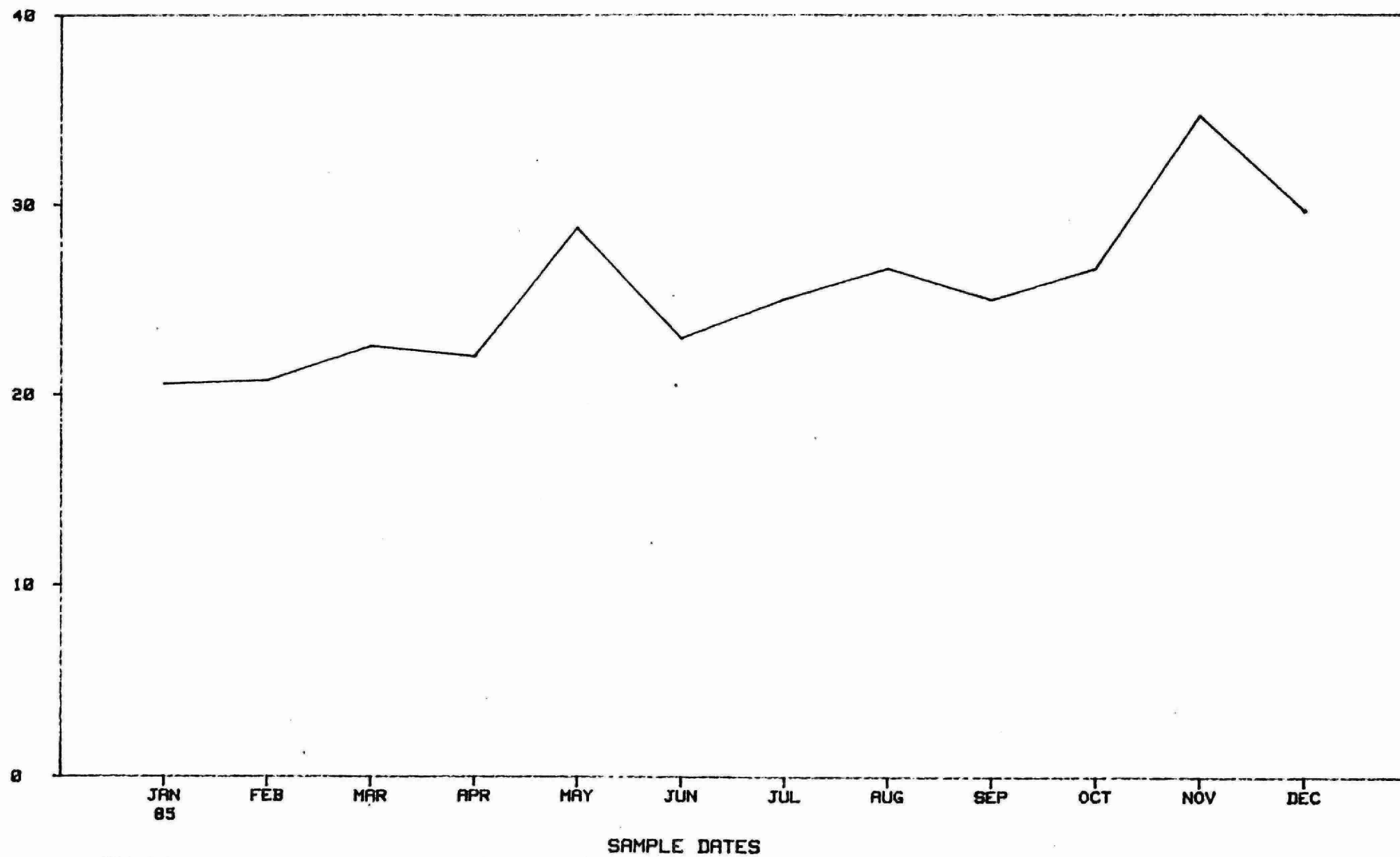
AXIS

L

LEGEND

— FLOW - TOTALVOL.

- 18-30-8



SCHREIBER W.P.C.P. 1985
AVERAGE DAILY FLOW

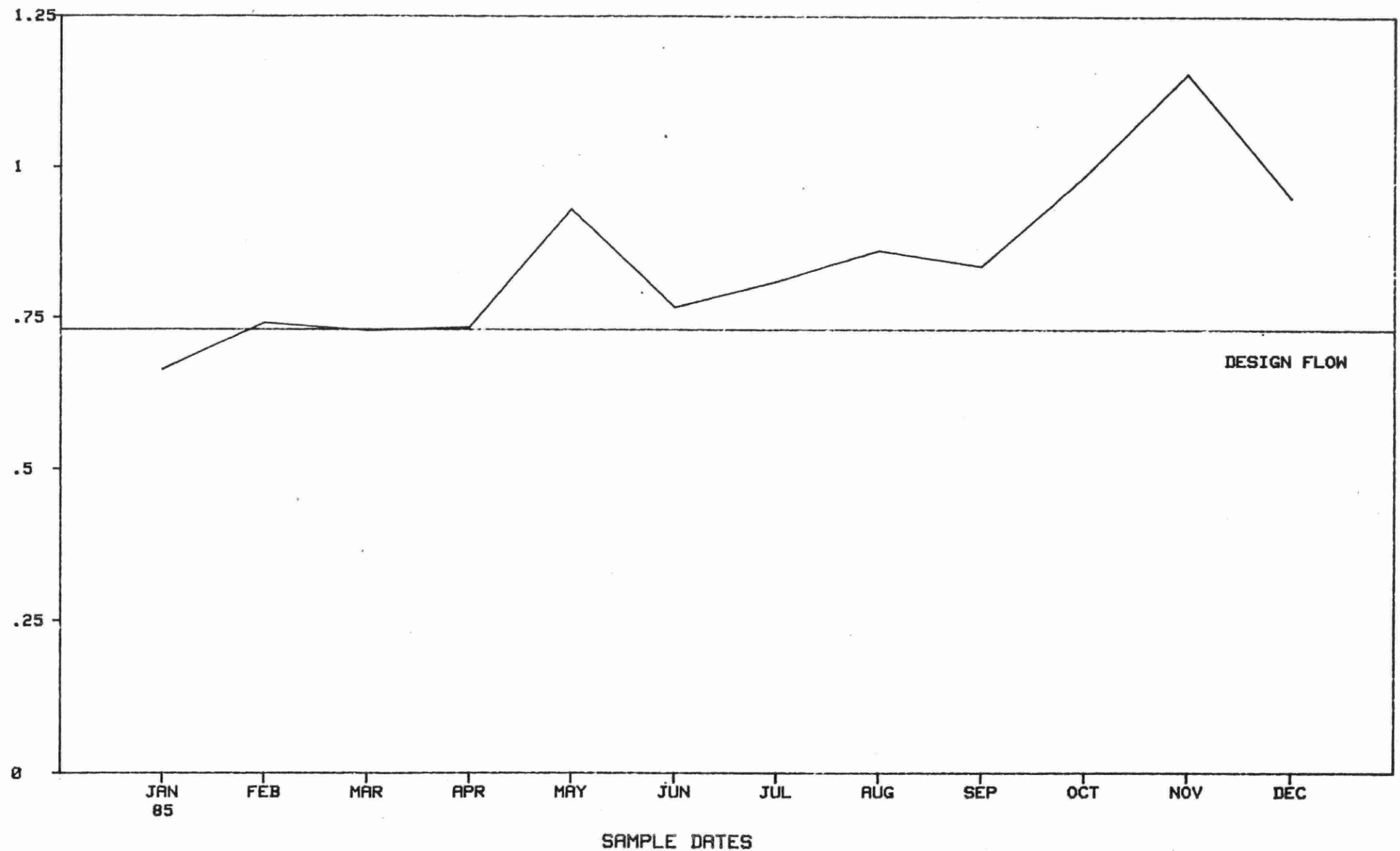
AXIS

L

LEGEND

— FLOW - AVG. DAILY

- 18-3m³/d



SCHREIBER W.P.C.P. 1985
INFLUENT VS. EFFLUENT
B.O.D. CONCENTRATIONS

AXIS

L

L

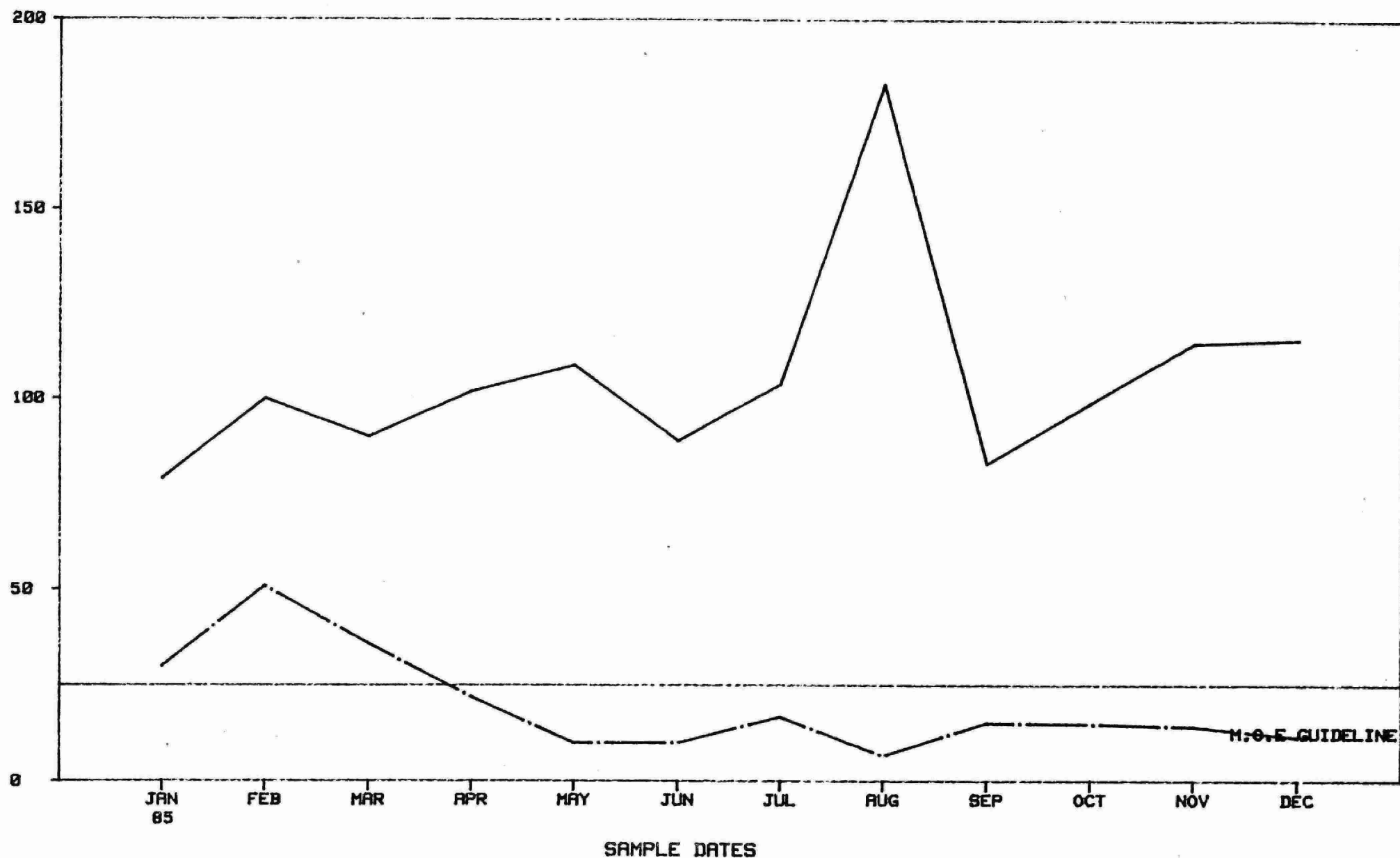
LEGEND

RAW SEWAGE - BOD

PLANT EFFLUENT - BOD

- mg/l

- mg/l



SCHREIBER W.P.C.P. 1985
INFLUENT VS. EFFLUENT
SUSPENDED SOLIDS CONCENTRATIONS

AXIS

L

L

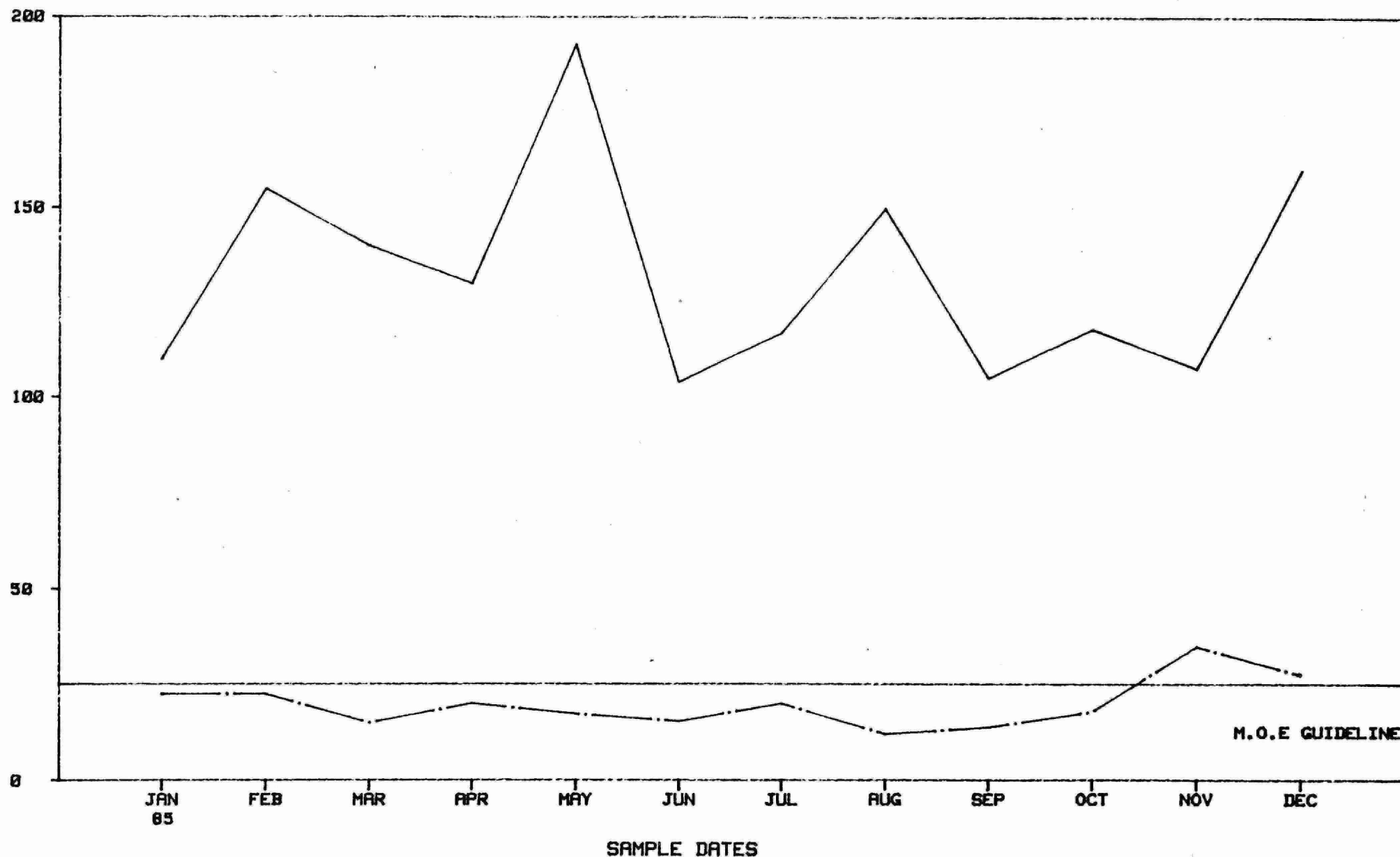
LEGEND

RAW SEWAGE - 88

- mg/l

PLANT EFFLUENT - 88

- mg/l





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